Rock Products

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Gold Recovery from a Sand and Gravel Plant Operation

Grant Rock and Gravel Company, Fresno, Calif., Has Byproduct of Yellow Metal

ACCORDING to present knowledge, past history and tradition, sand and gravel deposits in many localities in this country contain some gold. Sand and gravel river beds in California and in some of the Rocky Mountain states are still worked by gold dredgers or other placer-mine operations. Gravel deposits have been similarly mined for gold at one time or another in South Carolina, Georgia and Indiana and probably elsewhere. Nor is gold the only rare mineral that may be contained in sand and gravel deposits. Monazite, for example, is a rare mineral commercially produced by separation from sand and gravel in South Carolina, and its presence had been reported from other sections. It is used in making mantles for gas burners.

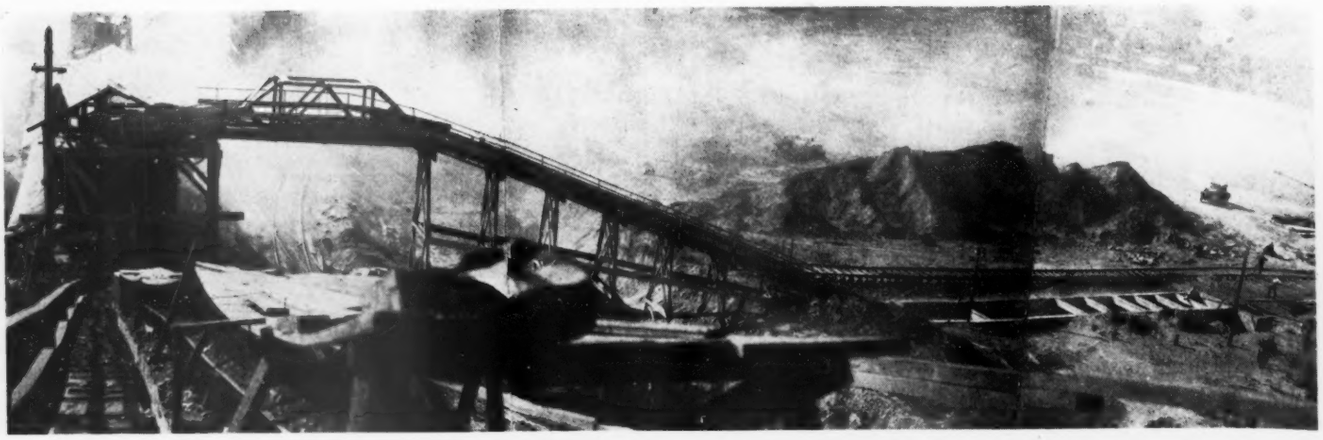
Except in the case of a few Far West deposits probably the working of sand and gravel deposits for these rare minerals and wasting the sand and gravel is uneconomical as a commercial proposition. But how about processing commercial sand and gravel a little more to recover some of these rare minerals, if they be present, as byproducts? Where an operator is handling from a quarter of a million to a million tons of sand and gravel a year as part of his routine it obviously does not require the recovery of more than a few cents' worth of precious mineral per ton to justify some effort to get it, if it is there.

A case in point is the Grant Rock and Gravel Co., whose plant is near Fresno, Calif., and whose deposit is an old river bed in the San Joaquin valley. There is 4 to 5 cents' worth of gold in every ton of this sand and gravel deposit and what's more the company is recovering it. Any sand and gravel operator can take out his pencil and figure out what this means on an annual production of over half a million tons; and he can decide for himself what he would be willing to pay, too, for recovering this byproduct. How absurdly simple it is to recover this gold will appear as the reader gets deeper into this article.

Gravel bank of Grant Rock and Gravel Co., Friant, near Fresno, Calif.—San Joaquin river flows on the left

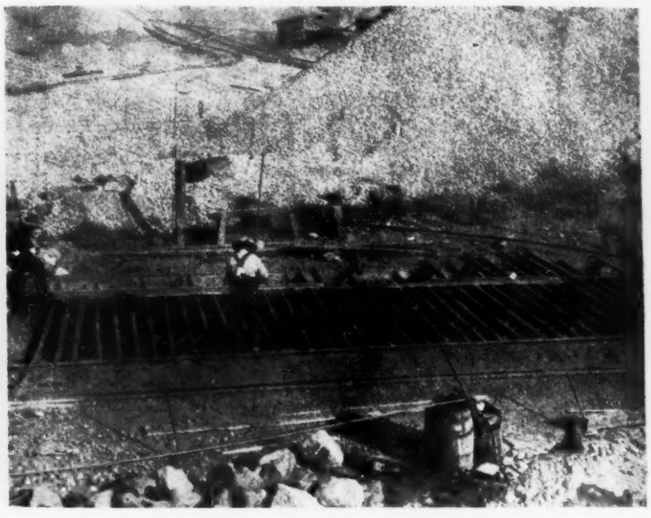
The Deposit

The gravel bank that has been opened is about three-quarters of a mile long and has a 30-ft. face. The bank parallels the San Joaquin river and the deposit extends back,



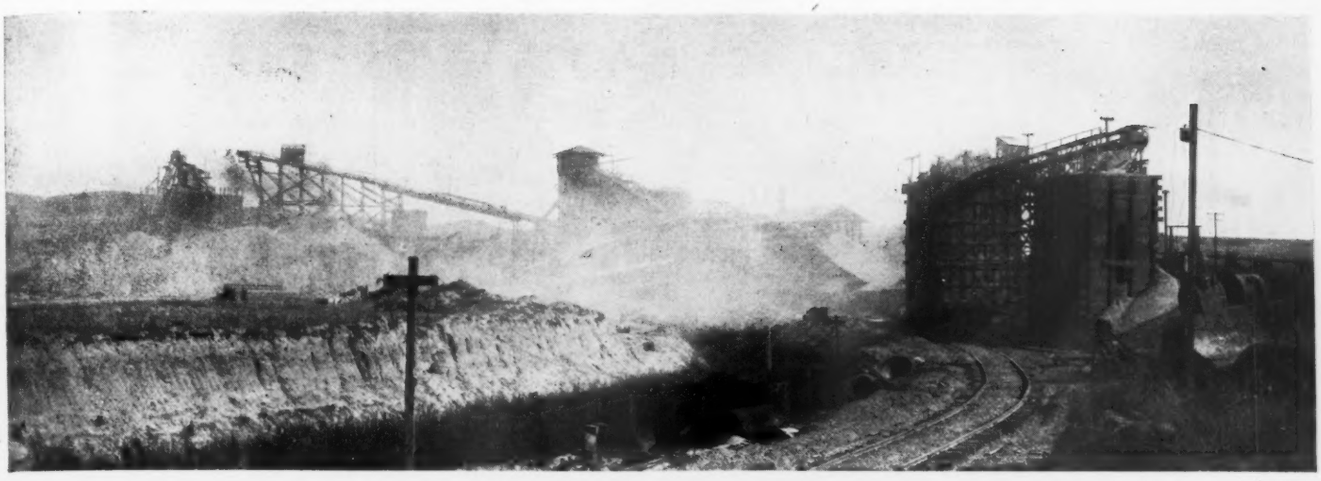
General view of three-car capacity receiving (extreme right); concrete conveyor gallery, and 30-in. conveyor belt feeding plants—the stone plant in the background, sand and gravel plant in the foreground

Train load dumping at receiving hopper

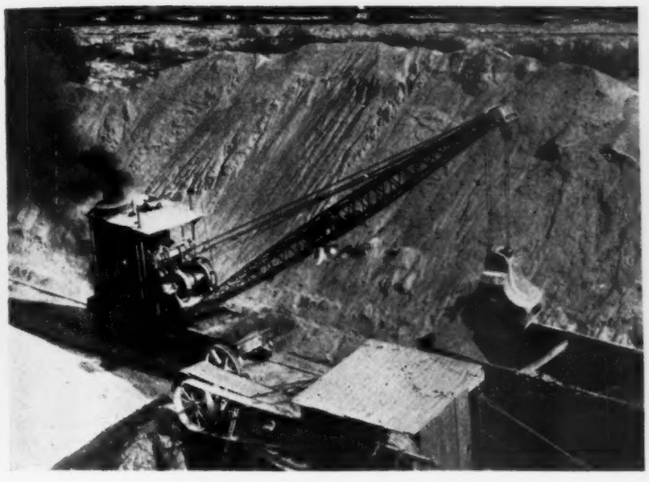


View of grizzly over receiving hopper

General view of crushed-stone plant shows dust-collecting fans exhausting into dust pile (and atmosphere) alongside the plant



General view of sand and gravel plant—partly hidden by dust from the rock plant



Two views of the 15-ton locomotive crane and stock-piling system

Dry-screening gravel and recrushing plant for making smaller sizes of gravel from 2½-in. size

in the form of a high, gently sloping plain, to the foothills, several thousand feet distant from the river. The bank contains a very considerable percentage (about 50%) of pebbles and boulders, most of them from 6 to 8 in. in size.

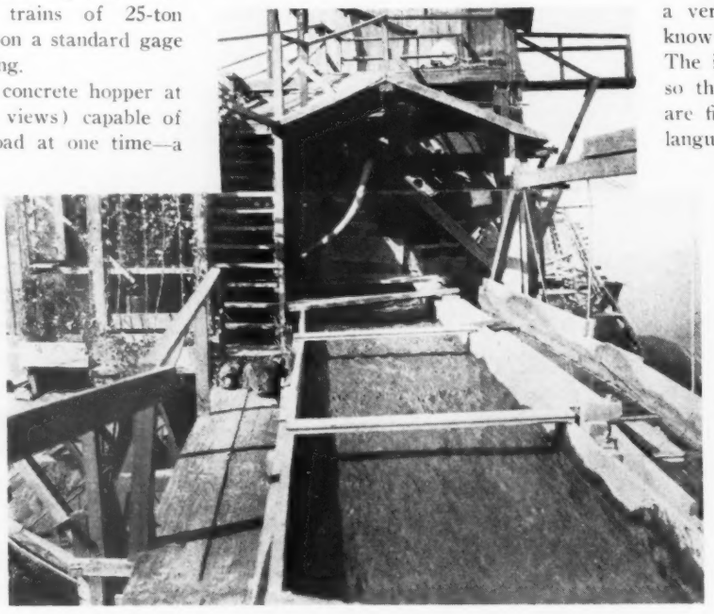
Operating Details

Excavating is done with a 90-ton Bucyrus steam shovel (oil burning). Transportation between the pit and the plant is accomplished by two 30-ton Climax geared locomotives and three-car trains of 25-ton Western-type dump cars on a standard gage railway, about a mile long.

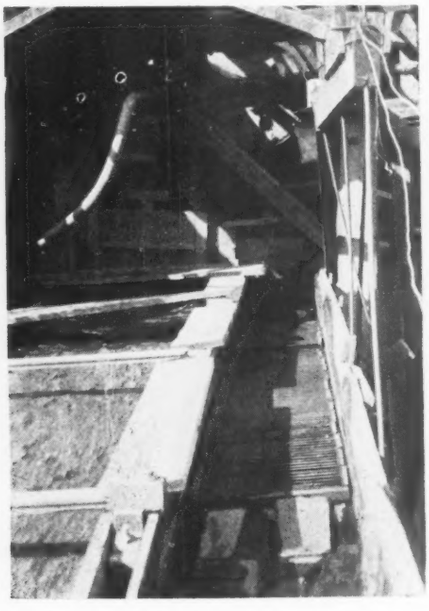
The cars dump into a concrete hopper at the plant (shown in the views) capable of holding a whole train load at one time—a feature of considerable importance in the economy of operation, which could well be copied at other plants. The long receiving hopper covered with grizzly bars) makes it possible to dump the whole train load in a very few minutes, thus expediting the train movements to a very appreciable degree. Every operator is familiar with unloading conditions where the train is held up for a considerable period to await the absorption of the material at the receiving hopper. At this plant that difficulty and cause of delay are entire obviated.

To prevent flooding the belt conveyor and screening system the bottom of the concrete receiving hopper is provided with three independent pan-type feeders, one or all of which may be operated at the same time, depending chiefly on the character of the material being received. If it is too much of one kind—sand or gravel—the feed to the belt can be regulated accordingly. With this arrangement the flow of the material to the plant can be kept uniform from train load to train load; and there is no need for delay at either the shovel or the receiving hopper.

A 30-in. conveyor belt takes the material from the hopper to a scalping screen, which separates everything over 2½ in. in size. The oversize goes to the rock-crushing plant which produces crushed stone. The material less than 2½ in. goes to a sand and gravel washing and screening plant.



The riffles where gold is recovered from sand going to settling tanks and miner's cabin 1924 style



Another view of the riffles

Rock-Crushing Plant

The material to the rock plant (over 2½ in.) is put through another scalping screen, the larger sizes being diverted to a 24x36-in. jaw crusher, while the smaller sizes go to a Symons' disk crusher. Dry screens (rotary) and Hummer electric vibrating screens make separations down to ⅜ in.

There is nothing unusual about this crushing plant except that it is equipped with a dust collecting system with intakes at the crushers, which exhausts the dust into the atmosphere alongside the plant. The views show that this part of the plant is plenty dusty—the material being chiefly granite boulders.

Sand and Gravel Plant Gold Recovery

The sand and gravel washing and screening plant does not vary from the usual standard practice, with the exception that it is designed to recover gold. Separations are made at 2½, 2, 1, ½ and ⅜-in. sizes of gravel. Sand is divided into two grades or sizes.

The unusual feature of this plant is the apparatus for recovering gold dust. All the material goes through a scrubber at the top of the plant. The clean gravel is separated out and all the washings and sand flow from the scrubber down a flume, the bottom of which is lined with iron riffles to catch and hold the gold dust. The riffles are merely iron pans with vanes or corrugations which retain the particles that are dragging on the bottom. That, of course, is where the gold dust is.

Simple as the gold riffle may seem, it is a very interesting device, and one has to know something about it to get it to work. The inclination of the flume must be right so that the little pockets betwen the riffles are filled with "boiling" sand. In technical language this would be called a "hindered settling bed." The heavy gold will sink in this along with the "black sand" (magnetite) that invariably accompanies it. But particles of lighter mineral will be carried over without settling.

Beyond the riffles the sand separating tanks are the same as in the ordinary sand and gravel plant.

The *modus operandi* of recovering the gold from the riffles is very simple. The company employs an old, experienced Alaska gold miner, who lives in a little shanty alongside his riffles. At regular intervals he diverts the flow of material from the main flume to the smaller one at the right (see accompanying view; gathers up his riffle pans, one at a time, scrapes out the collected sand (concentrate) into a wash tub, and having cleaned all the riffles, he treats the sand concentrate in the tub with quicksilver or mercury, which forms an amalgam with the gold dust. This amalgam is turned over to a local chemical laboratory which

Harry Frost, superintendent

distills off the mercury, leaving practically pure gold. The mercury, of course, is used over and over again.

Stocking Facilities

It is doubtful if any other sand and gravel plant with a 30-in. feeding belt, and equal screening and washing facilities, produces more material per day, day in and day out, than this one. The reason is that because of the extraordinarily well-designed receiving system it is possible to bring a train load of material to the plant every 15 min. It takes about 15 min. to empty the hopper. The result is that no part of this plant is ever running idle.

J. D. Hill, sales manager

If orders are not in hand to ship the material as made, it is put into ground stock piles by means of standard railway cars (borrowed for the occasion) and two locomotive cranes, both Brownhoist, one 30-ton and the other 15-ton. All sizes of material are stocked in appropriate piles. The resulting reduction in production more than repays the cost of rehandling as has been found to be the case under similar circumstances elsewhere.

Experience at this plant is that the 15-ton crane is preferable for this service; since the heavier one is more difficult to operate on tracks that are usually maintained under rather wet and sloppy conditions. The lighter crane handles more in proportion to its weight, and has a less deteriorating influence on the tracks.

Incidentally, this is the only industry on a 35-mile branch line of the Southern Pacific railway; and, according to the admission of a high official of the railway to a local banker, it is the most profitable railway line on the Southern Pacific Coast System. About half a million dollars a year in freight on sand and gravel is collected from the operation of one freight train each way per day.

The offices of the Grant Rock and Gravel Co. are in Fresno, the plant is at Friant. H. M. Estes is president; Frank B. Peterson, vice-president; Edward Schlee, secretary; J. D. Hill, sales manager and Harry Frost superintendent at Friant.

New York Stone Company Rebuilds Its Burned Plant

UPON the ruins of the $30,000 fire at the plant of the Worlock Stone Co. of Canastota, N. Y., is rapidly arising a new plant equipped with all the latest devices for the handling of lime stone.

R. D. Woolsey, company official, stated recently that he expected the plant would be in readiness for operation by March 1. In the large new building there will be a crushing plant, lime mill, storage bin and power mixer.

The crusher will have the capacity of 400 tons daily and an air swept tube mill is to be installed. The storage bins will have a capacity of 4500 tons.—*Syracuse, N. Y., Herald.*

Another Los Angeles Gravel Plant Begins Operations

THE new electric driven rock crushing plant of the National Rock and Gravel Co. began operation recently in the San Fernando wash, west of Lankershim, near Los Angeles.

The concern will produce washed rock products, plaster sand, crushed rock and gravel. The plan has a 150-hp. line operating a large crusher and washing screen, giving a capacity of 400 tons of material per 8-hr. shift.

The plant is also provided with a tunnel stock pile with storage capacity of 1200 yd. of sand and rock in addition to the regular bunker capacity. All raw material is taken out with a drag line hoist and carrier of latest design.

The officers of the National Rock and Gravel Co., Inc., are as follows: W. J. Hahn, president; Gordon Lewis, vice-president; H. C. Richardson, secretary; H. H. Babcock, treasurer; and these with G. M. Crawford and M. R. Ebersole, comprise the board of directors. The plant cost approximately $30,000.—*Los Angeles Times.*

Big 3000-Ton Crushing Plant Near Albany N.Y., Almost Completed

A BIG limestone quarry, the newest project in The Capitol District industrial expansion, is to be opened at Fuera Bush, N. Y., April 1, by the Albany Crushed Stone Corporation.

The corporation is now constructing crusher equipment below a high ledge of rock near the West Shore railroad, one and one-quarter miles south of Fuera Bush, where the New York Central is building its new freight yards. This rock contains more than 100,000,000 tons of stone, it has been estimated by engineers, and there is also a large supply of stone below the ground level.

Preparations are being made for an output of 3000 tons of crushed stone daily. Most of this, the officers of the company say, will be sold for railroad ballast and the rest for highway construction purposes. A quality of ground lime for agricultural usages also is to be produced.

J. Harris Loucks, of Albany, president and one of the directors of the corporation, started the plans for the new quarrying business more than a year ago.

Other directors are Frederick W. Kelley, president of the Helderberg Cement Co. at Howes Cave; Lawrence Murray, president of the Albany Sand and Supply Co.; Edward B. Cantine, a director of the Municipal Gas Co.; William L. Visscher, president of the Albany County Savings Bank; Arthur T. Palmer, of Tebutt & Palmer; Newton B. VanDerzee, trustee of the Albany County Savings Bank; Harry H. Kohn, secretary of the Albany County Savings Bank; David H. Craw, former president of David H. Craw, Inc.; George D. Kittredge, assistant superintendent of the Walsh Construction Co.; and Kenneth Creble, an Albany attorney.

Charles A. McNall, formerly assistant engineer in charge of the Hudson River connecting railroad's construction work on the west side of the Hudson, is general superintendent in charge of the project. Mr. McNall, who has been with the New York Central for about 16 years, was loaned to the corporation by George W. Kittredge, chief engineer, for the New York Central, for a three-year period.

The stone has been tested by the Rensselaer Polytechnic Institute, the du Pont Powder company, and by Russell S. Greenman, of the state highway department, and has been found to contain 96% lime. The stone also has been examined and approved by Chief Engineer Kittredge of the New York Central and by Harry Frasier of West Virginia, formerly chief engineer of the Chesapeake & Ohio Railroad Co.

The company is capitalized for $200,000 in common stock, and it is planned to increase this to $250,000.—*Albany, N. Y., News.*

Geology of Glass Sand in Eastern West Virginia

The Geological Conditions Which Indicate the Purity of Silica and How They Are Recognized

By Beverley S. Randolph
Civil and Mining Engineer, Tonoloway, Md.

THE large demand for sand of all kinds which has grown up of recent years does not appear to have been accompanied by corresponding knowledge of its geology, when we contemplate the number of unsuccessful plants erected for its production, whose failure is directly traceable to the fact that the deposits which they were designed to exploit, proved deficient in quantity or lacking in the quality necessary for success.

This is especially true of the higher grades of sand where the quality is a factor of prime importance.

With the hope of adding to the knowledge available along this line, a discussion of the geological facts developed in the exploitation of the glass sand deposits of eastern West Virginia and southern Pennsylvania, is presented.

Throughout the district in question the only successful plants erected for the production of the higher grades of glass sand have been on the Oriskany formation of the Devonian. To such an extent is this true that the converse of the proposition is frequently assumed, viz., that if located on the Oriskany the material will necessarily be satisfactory.

That this is far from the truth abundant evidence is present on all sides.

A First-Class Glass Sand

A first-class glass sand must present a satisfactory aspect from three viewpoints:

First, it must be a practically pure silica, especially must it be free from metallic oxides calculated to impart color to the glass.

Second, the grains must be, as nearly as practicable, uniform in size and shape so that they will melt down simultaneously in the furnace. Such uniformity of size also makes possible the obtaining of more satisfactory results in the necessary washing. About 1/50 of an inch appears to be the diameter which gives best results.

This, of course, precludes any crushed stone which breaks with an irregular or conchoidal fracture into pieces of different sizes, however pure it may be chemically.

The third aspect is economic. The character and position of the deposit must be such that it can be prepared for market at a cost which will render its exploitation profitable.

"IN line with your remarks in your previous letter on the importance of geology in quarry operations,—From where I now sit there are two operations visible which between them have sunk not less than half a million dollars, a loss which an elementary knowledge of geology would have avoided.

"While this case is simple the one referred to in your last letter as reported in ROCK PRODUCTS, where the subtle difference in character of material is beyond the reach of the usual methods of analysis, and the beds which have proved satisfactory must be identified by their fossils, presents a much more elaborate problem. The conditions covered by my paper are somewhat the same. Here the bed is continuous and the fossils the same but the suitable material is confined to the easternmost areas.

"Of course this means that, in both cases, the suitable material has encountered conditions in the past which resulted in producing the desired qualities. The tentative theory advanced by me may hold or may break down in the light of further study and the difference may be really a chemical one, as would appear to be the case with the limestone problem above referred to.

"The recent advances in radio activity and the electrical constitution of matter would seem to open up unlimited possibilities along such lines.

"There is plenty of work ahead for everybody."—From a letter of Mr. Randolph to the Editor.

As the deposits being worked throughout the region in question exist as a (more or less) friable sandstone the ease with which the material can be quarried and crushed governs this feature.

The Oriskany formation was laid down in a sea which had for its eastern boundary the primordial peninsula or island extending from southeast Pennsylvania through Maryland, a short distance west of Washington, and thence in a southwesterly direction well into Alabama and Mississippi. To the west this sea appears to have, practically, covered the continent.

The formation was, naturally, included in the Appalachian folding and the subsequent denudation has left the Oriskany exposures in a series of low anticlinal and monoclinal ridges, principally the latter, as the beds are not usually heavy enough to sustain an exposed anticlinal very long and, when once a breach is made, the underlying Helderberg limestone dissolves and breaks down rapidly, converting the anticlinal ridge into an anticlinal valley, bounded by the monoclinal Oriskany ridges.

The Oriskany Sea

The sea in which the formation was laid down appears to have been very variable in depth, as the beds vary greatly in character within short distances, ranging from a pure sandstone through a variety of argillaceous sandstones, arenaceous clays and limestones. The weather conditions must have been very stable as the grains of the various materials are uncommonly even in size. The ultimate grains of the sandstones are usually quite pure silica, the impurities existing in the matrix and the joints.

When, therefore, the ultimate grains can be readily separated the first two aspects of a good glass sand, chemical purity and even grain, are present.

All the rocks of the region in question are more or less metamorphosed, the sandstones being frequently converted into a pronounced flint. The Medina, underlying the Oriskany several thousand feet, supplies large quantities of excellent ganister.

Such rocks break into irregular grains and are therefore unsuitable for glass making. The Oriskany is the only one which crushes with the necessary even grain and it possesses this quality only in its easternmost outcrops.

This unique characteristic therefore argues something peculiar in the surrounding conditions, past or present, and the writer believes this is to be found in the occurrence a short distance above the Oriskany, in the overlying Romney shale, of a horizon which is, in places, so highly carbonaceous as to supply thin beds of combustible coal and also the presence of the Helderberg limestone, immediately underneath. This limestone, being filled with open channels, common to all limestones above the ground water level, effectively drains the overlying Oriskany, allowing the water, charged with carbonic acid from the overlying Romney shale, to pass through and dissolve and weaken the matrix which is usually somewhat calcareous, so that a separation into the ultimate grains takes place readily in milling.

This would argue that the satisfactory quarries are those where this action can best take place and agrees fully with the exploitation experience. The influence of the carbonaceous shale is confirmed by the fact that it is only present above the Oriskany along its eastern outcrops where the glass sand is found.

In places this Oriskany sandstone has proved unsuitable for glass making owing to the presence of oxide of iron in the joints which it was impossible to remove in the washer.

This occurs where the overlying Romney shale is either still present or has been eroded in comparatively recent time. This shale contains considerable oxide of iron, as limonite, which comes down with the descending waters and is deposited in the joints of the sandstone.

Areas where these conditions obtain are therefore to be viewed with suspicion.

Where the erosion of the shale has left the sandstone exposed for a long period of time, the meteoric waters leach out the iron, leaving the stone in the best condition for the production of glass sand.

The best deposits are therefore to be found well above the general level of the surrounding country, where nearby depressions supply active drainage, and where the topographic conditions indicate long exposure to the action of surface waters, and a skillful geologist should be able to predict the character of the material in any locality with reasonable certainty.

What State Geological Surveys Are Doing for Rock Products

Help Both Landowners and Producers to Solve Economic Problems

By R. W. Stone
Pennsylvania Geological Survey

MOST STATES in the Union have some sort of a Geological Survey, or at least one officer who functions as a State Geologist. These scientific bureaus are maintained at the expense of the taxpayers and stand ready at all times to serve the public. The ability to serve depends on the quality and training of the staff and on the continuity and size of appropriations. Help can be rendered to the mineral industry of a state in many ways, including comprehensive surveys of mineral resources, consideration of individual problems, and detailed area mapping of geology. A large part of the service may be by correspondence in answer to letters. Far too few of the citizens realize that their state maintains a survey which can and will help them free of charge with their mineral problems. At least this is so with Pennsylvania which has one of the largest state geological surveys in the country.

A state geological survey exists for purely economic reasons. Suppose 100 men in a year want to know for commercial purposes where a certain kind of rock may be found. Had there been no Geological Survey each man would be obliged to make a field examination for himself, traveling hundreds of thousands of miles and spending many months in the search. None but the largest corporations could do such work for their own purposes. To avoid the endless repetition of field examinations and thus save its citizens great expense the state does this work and makes the information available to all for the asking.

A state survey obtains mine maps and records of deep drill holes which are not accessible to private individuals or corporations. By the means of this confidential data the survey correlates strata and works out underground structure with an accuracy not otherwise obtainable. When this work has once been done by a competent corps of geologists it is possible to tell any owner what lies under his land, how far below the surface at any point a coal bed, limestone, or sandstone may be found, even though the nearest exposure may be 20 miles away and the given bed 1000 or 2000 feet from grass roots. All this information is most valuable in selling or buying land and if the citizens are to have it at the least cost, they must employ their own corps of geologists.

In a state like Pennsylvania where the mineral industry is huge, a state geological survey annually saves the citizens many times the amount of the legislative appropriation. This saving comes about through having on hand and furnishing to the individual or corporation the information which otherwise it would cost the inquirer large sums to procure by private field study; and secondly, by keeping the citizen from investing his money in a mining or quarrying proposition which has no chance of financial success because of geographic position, overproduction, over abundance or lack of the mineral, or other factors which must be considered and may not be thought of by the enthusiastic prospective investor. For example, the Pennsylvania Geological Survey would not encourage the building of a portland cement plant which rumor says is contemplated in the central part of the state, because the existing plants have capacity far in excess of the demand.

The Pennsylvania Survey published in 1919 a 275-page report on the Glass Manufacture and Glass Sand Industry in Pennsylvania, not so much for the benefit of the present producers but to enlighten land owners who have deposits of glass sand and other who contemplate entering the industry. The Survey now has in press a report on the silica refractories which will be of use to the manufacturers

of fire brick, operators of ganister quarries, and those interested in knowing where the right kind of rock occurs and how much there is of it. A report on the limestone resources is in preparation that will show the distribution of the different kinds of limestone, the high calcium, high magnesian, high silica, etc., that will discuss the origin, various uses, and methods of quarrying and burning limestone, and so be of benefit to all interested in this large industry.

A detailed examination of the slate quarries was begun in the summer of 1923 with the hope that it may develop a better understanding of the reason why slate occurs where it does, its relation to rock folds, and so help quarry operators in opening new quarries or extending old ones.

Samples of iron molding sand are being collected for testing by the new methods developed by the American Foundrymen's Association with a view to standardizing these materials. This will be beneficial to both foundrymen and sand producers, and may lead to the discovery of valuable deposits where none are known now.

The following letters illustrate the correspondence service:

November 21, 1923.

I would like to have the following information on trap rock in Pennsylvania. In what section of the state is it found? How many operations in the state? What is a fair royalty basis for selling it in natural position per ton? What crushing strength per square inch must it have to be commercially valuable?

November 26, 1923.

In reply to your letter of November 21:

Trap rock, a common term for a dark finely crystalline igneous rock, occurs only in southeast Pennsylvania south of a line from Easton to Halifax on the Susquehanna near the mouth of Juniata River and east of a line from Halifax to Waynesboro. To the best of my knowledge there are about 25 operations on this trap rock which is quarried largely for road metal and railroad ballast and rough building.

The royalty basis for selling trap rock in its natural position would depend very largely on the accessibility of the material to a railroad, the distance from a market, the readiness with which a quarry can be opened, and other factors of this nature. In view of the fact that crushed trap rock in southeastern Pennsylvania is quoted at $1.25 for screenings and $1.40 to $1.55 per ton for the larger sizes, I feel convinced that no producer could afford to pay a royalty of more than five cents per ton, and that only if the situation of the quarry and quarry conditions are of the very best. Under less favorable conditions a royalty of two or three cents per ton would be all that a producer would be justified in offering.

On inquiry of the State Highway Department I find that all true trap rock in Pennsylvania has proved to be perfectly satisfactory for road building purposes and the tests applied to it are for abrasion rather than for crushing strength.

Your attention is called to the fact that the American Lime and Stone Co. and the Water Street Trap Rock Co. operating in Water street, Huntingdon county, are not producing trap rock. Their output is a quartzite or resilicified siliceous sandstone. This fact is well known to these producers but the trade name "trap rock" is used for commercial purposes. The material which they are quarrying, that is, a very hard quartzite, has a crushing strength of 19,050 lb., but material of that nature having 15,000 crushing strength is suitable for highway construction and railroad ballast. The geologic formations which carry this quartzite outcrop extensively through the mountain region of central Pennsylvania.

Yours very truly,
GEORGE H. ASHLEY,
State Geologist.

The foregoing indicates what the producers of rock products can get from their State Geological Surveys if they will only ask for it. In return for this service of course it is incumbent on the producers to see that their legislators make adequate appropriations for the maintenance of an adequate scientific staff so that the Survey may supply the needs of the taxpayers without fear or favor.

Early Portland Cement Manufacture in Indiana

THE Greencastle, Ind., *Herald* carries the following account of portland cement manufacturing in Indiana:

The one hundredth anniversary of the invention of portland cement, which will be observed throughout 1924 by the cement industry, calls to mind the fact that one of the first portland cement mills erected in the United States was built in Indiana in the early 70's. Although an English brick mason named Joseph Aspdin took out the first patent for portland cement in 1824 in England, it was almost 50 years later that Americans began the manufacture of the material, and Thomas Millen of South Bend was one of the first to embark in the industry.

In 1871 Mr. Millen and his two sons were engaged in the manufacture of cement sewer pipe, artificial stone sidewalks and other cement products at South Bend. At that time portland cement was being imported from foreign countries and the first car brought into South Bend by the Millens cost then $9.12 a barrel. One day a visitor to the office recognized some of the imported barrels as coming from a firm he had worked for in England. He aroused the interest of the Millens by asking them why they did not make their own cement. Although he was unacquainted with the methods of portland cement manufacture he told Mr. Millen of a book that had been published on the industry. This book was finally located and after studying it Mr. Millen decided to attempt the manufacture of the new material.

The marl around the lakes at Notre Dame and the blue clay in the river bed of the St. Joseph river appeared to be ideal raw materials for the product. Thomas Millen would drive out to the lakes and get two pails of marl and pick up a pail of clay at the river and bring them back to his plant in a buggy. His son, Duane Millen, would then mix the materials with his hands and burn them in a piece of sewer pipe. After burning they would grind them in a coffee mill.

After six months of experiment the Millens erected a kiln at South Bend. It was 12 ft. high by 4 ft. in diameter. Other kilns were then built and the War Department took the entire supply of their product. In 1886 Duane Miller erected a mill at Warners, N. Y., and a few years later the Millens sold both plants and engaged in the manufacture of cement at Wayland, N. Y.

Within a few years after the building of the Millen plant, other plants were in operation in various parts of the country. The old-fashioned grinding machines soon gave way to gyratory crushers and the dome-like kilns were supplanted by modern rotary kilns, burning pulverized coal. Since the time of the original South Bend mill the cement output of this country has increased from a few thousand barrels a year to approximately 135,000,000 bbl. in 1923, so that it is now one of the largest industries of the country.

Barytes in North Carolina

BARYTES is found in great quantity in the region along the French Broad river, northwestwardly from a line drawn approximately northeast and southwest through Barnard. The deposits continue beyond the North Carolina - Tennessee state line, into Tennessee. The amount of barytes in the region consists of many millions of tons, but much of it is not sufficiently high in barium sulphate to be available in ordinary manufacturing processes, the impurities being largely flourite and silica, both of which are highly undesirable. Mining has been spasmodic through a period of more than 40 years, but the tonnage has been inconsiderable, certainly not more than 400,000 tons, practically all from two groups of mines, known respectively as the Long Mountain mines, within four miles of Hot Springs, and the Stackhouse or Sandy Bottom group. There are large amounts of barytes available in these properties. Estimates of the reserves above the bed of the river only must be crude, but the amount is large, some 500,000 to 1,000,000 tons, and there are good reasons to believe that the level of the river indicates the point at which pumping will begin to be an important consideration, rather than the termination of the barytes. Another mine which has produced quantities of barytes in this region is the Graham mine, the ore of which is white in color and of attractive appearance, but prejudiced by a content of flourite, from 3 per cent upward. The Stackhouse properties permit of economical working, on account of proximity to the railroad and features conducive to easy mining. There is absolutely no mixed or intermediate material — every fragment coming from the mine is either all barytes, or all rock, or dirt, that is, clay, mud or sand.—*Natural Resources (N. C.)*

Production of Lime in 1923

Increase in Output and Value

ABOUT 4,057,000 short tons of lime, valued at $39,413,000, was sold in the United States (including Hawaii and Porto Rico) in 1923, according to an estimate made in the Department of the Interior, by the Geological Survey, from preliminary reports received from the principal producers. This quantity is more than 11% greater than that sold in 1922, and only slightly less than that sold in 1916, the year of largest recorded production. The average value per ton in 1923 is estimated at $9.70. In 1922 it was $9.14. Of the 42 states and territories that produced lime in 1923, 16 showed a decrease and 26 an increase in output as compared with 1922. Nearly all the states that showed decrease in 1923 are small producers or larger producers that serve local markets or that supply a demand for special lime products. Ohio retained the position that it reached in 1922 as the leading state in the manufacture of lime. The growth of the industry in Ohio is due chiefly to the increased output of building lime, most of which is hydrated lime. In Pennsylvania which was formerly the leading state, there has been during the last few years a decided decrease in the output of lime manufactured for use in agriculture, and no corresponding increase in the sale of lime for chemical and structural uses.

The sales of hydrated lime in the United States in 1923 are estimated at 1,206,000 short tons, an increase of 9% over those in 1922 and the largest yet reported. Of the 31 states that reported an output of hydrated lime in 1923 several showed a small decrease, but the increase in such states as Ohio, Pennsylvania, Missouri, and Virginia kept the sales well above 1,000,000 tons, the production in 1922. The estimated value of the hydrated lime sold in 1923 was $11,824,000, an average value of $9.80 a ton. The average value in 1922 was $8.92

The reports to the Survey indicate that about the same number of plants were in operation in 1923 as in 1922. Many improvements were made at plants and kilns in order to reduce the cost of labor to a minimum and to increase efficiency. Wages were high, and at times, especially in the summer, common labor was hard to obtain. The cost of operation was generally higher than in 1922, although coal was more plentiful and somewhat cheaper. The manufacturer that sold lime in barrels found that the increase in the cost of barrels caused a corresponding increase in the cost of lime per barrel. The demand for lime in 1923 was obviously greater than in 1922, but appeared to vary with local conditions and with the use to be made of the product. The average price in 1923 was higher, but many reports show prices about the same as in 1922, or lower.

Construction Lime

The demand for lime for building enterprises was moderately large during the first part of 1923, but the general curtailment of construction work early in the year soon cut down somewhat the demand for lime. On the whole, however, this branch of the lime industry appeared to be prosperous. The increase in sales in 1923 will probably be about 17%.

Chemical Lime

The demand for chemical lime was steadier throughout the year than that for construction lime, and though some manufacturers of chemical lime reported small sales, the total sales in 1923 will evidently be more than in 1922—possibly 12%. The sales of refractory lime (dead-burned dolomite) amounted to about 395,000 short tons in 1923, as against 348,838 short tons in 1922, an increase of 13%.

Agricultural Lime

Although some producers reported a considerable demand for agricultural lime in 1923, reports from the chief producing states, including Pennsylvania, Maryland, Virginia, and West Virginia, indicate decreased total sales. The reason given for the decrease in sales is the inability of the farmers to pay the price charged for agricultural lime. Many farmers who burn lime for their own use reported increased output, but the manufacturers of commercial agricultural lime in the same district reported decreased sales. However, the high price of coal the scarcity of farm labor, and high wages, kept many farmers from burning lime for themselves or their neighbors.

The accompanying table shows the estimated quantity of hydrated lime and the estimated quantity and value of total lime sold in the principal producing states in 1923. The figures for 1922 are given for comparison.

Franklin, Tenn., Limestone Company's Plant Almost Completed

THE $150,000 new unit of the Franklin Limestone Co. near Antioch, Tenn., will soon be completed. "We are providing the spur track and bridge over Mill creek and going right ahead with the construction of the plant, which will be ready for business this spring," said H. E. Rodes, general manager, according to the *Nashville Banner*. "It will be near the Mims plant and will be the fourth in operation by the company. The output of the Franklin plant is 1000 tons of crushed rock a day, of Whitehead (Lewisburg) 600 tons, Mims, 600 tons, and the new unit 1000 tons. This gives a total of over 3000 tons a day, which, according to our best information, makes this the largest commercial crushing concern in the South."

LIME PRODUCED IN THE UNITED STATES IN 1922 AND 1923 (ESTIMATED)

State	1922 Hydrated lime Short tons	1922 Total lime Short tons	1922 Total lime Value	1923 (estimated) Hydrated lime Short tons	1923 (estimated) Total lime Short tons	1923 (estimated) Total lime Value	1923 (estimated) Average value per ton	Percentage of increase or decrease in 1923 Hydrated	Percentage of increase or decrease in 1923 Total
Ohio	537,816	752,916	$6,495,066	596,000	856,000	$8,250,000	$9.64	+11	+14
Pennsylvania	172,179	719,536	5,581,794	173,000	750,000	6,255,000	8.34	+ 0.5	+ 4
Missouri	56,024	203,984	1,953,524	64,450	251,000	2,454,000	9.78	+15	+23
West Virginia	49,712	210,146	1,643,055	48,000	243,000	2,111,000	8.69	— 3	+16
Wisconsin	21,680	189,558	1,589,931	20,350	227,600	2,208,000	9.70	— 6	+20
Alabama	15,016	168,135	979,331	14,500	198,000	1,300,000	6.57	— 3	+18
Virginia	15,284	152,436	1,251,683	30,600	175,000	1,350,000	7.71	+90	+15
Massachusetts	(*)	164,980	2,510,368	(*)	172,000	2,687,000	15.62	0	+ 4
Maine	(*)	127,840	1,757,480	(*)	139,000	1,898,000	13.65	— 7	+ 9
Indiana	38,832	113,246	938,645	44,000	128,000	1,152,000	9.00	+13	+13
New York	(*)	96,320	957,079	(*)	127,000	1,300,000	10.24	—12	+32
Tennessee	26,029	126,305	939,039	38,200	124,000	972,000	7.84	+47	— 2
Illinois	13,004	85,425	860,945	15,100	91,000	990,000	10.88	+16	+ 7
Michigan	(*)	53,635	484,945	(*)	80,800	842,000	10.42	—33	+51
Maryland	40,976	71,261	554,194	30,000	66,500	570,000	8.57	—27	— 7
California	(*)	55,161	683,774	(*)	65,000	862,000	13.26	+14	+18
Texas	21,163	52,552	524,985	22,200	62,000	597,000	9.63	+ 5	+18
Connecticut	(*)	52,108	743,742	(*)	59,700	833,000	13.95	+29	+15
Vermont	(*)	44,745	565,498	(*)	52,000	616,000	11.85	—13	+16
Minnesota	(*)	27,670	307,270	(*)	29,700	342,000	11.52	+74	+ 7
Undistributed	98,348	171,658	1,932,691	109,600	159,700	1,824,000	.....	....	....
	1,106,063	3,639,617	$33,255,039	1,206,000	4,057,000	$39,413,000	$9.70	+ 9	+11

*Included under Undistributed.

Remarkable Side-Hill Rock-Crushing Plant

Graham Brothers, Inc., Plant on Santa Catalina Island, California

By Edward C. Barkstrom

Engineer, Stephens-Adamson Manufacturing Co., Los Angeles, Calif.

SITUATED off the Southwestern part of the United States is Santa Catalina Island. The island is about 30 miles from the mainland of California, south of the ports of San Pedro and Long Beach. Transportation of all-year tourists is very efficiently conducted by the Wilmington Transportation Co., which with the many natural beauties of the peaceful isle makes it a haven for thousands of people throughout the year.

It is on this beautiful island that the Graham Brothers, Inc., of Long Beach, Calif., have opened a most modern rock crushing plant. (A progress article on this plant appeared in ROCK PRODUCTS, November 3, 1923.—Editor.)

The electric power for this mill and for the island is supplied by a central power plant located near Avalon which is operated by the Santa Catalina Island Co. The power units consist of Fairbanks-Morse type "Y" oil engines directly connected to 2300-volt alternators. The power comes in at 2300 volts, 3 phase, 60 cycle and is stepped down through transformers to 440 volts at this plant.

The construction of the mill was done by the Graham Brothers, Inc., under the superintendence of Paul C. Graham, and the engineering services on the installation were rendered by the Stephenson-Adamson Manufacturing Co. from their Los Angeles office. The mechanical and electrical equipment for the plant was purchased by Graham Brothers, Inc., through the Brown-Bevis Co. of Los Angeles. The Brown-Bevis Co., being agents for the Telsmith gyratory crushers and the Traylor jaw crusher, sold all the crushing equipment for the mill.

The quarry, which is at an elevation of about 260 ft. above sea level, was opened by C. Cushing of the Hercules Powder Co. After due study of the rock formation four-main tunnels with cross-cuts were driven and approximately 20 tons of powder placed in correct proportions. It was estimated that approximately 80,000 cu. yd. are available for the shovel and mill from this initial shot. The rock is very hard and tough, losing only an average of 12% in the standard rattler test and is of about 2.66 sp. g.

The quarry taken before the firing of the first big shot. Note the "coyote" holes into which the powder was carried

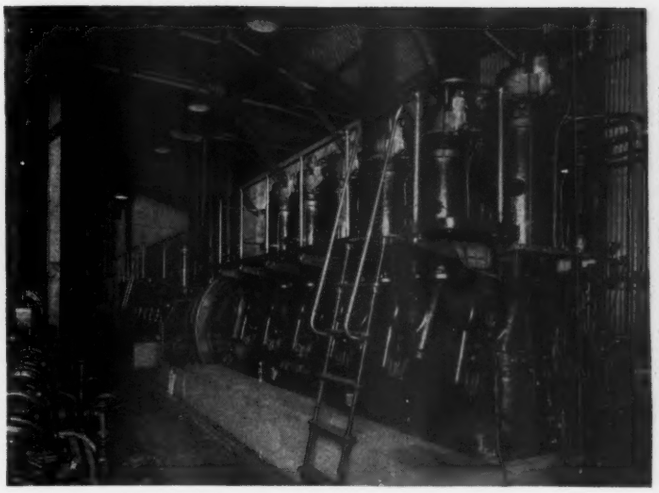
The quarry equipment at the present writing consists of a Bucyrus No. 70 steam shovel on standard gage track. The rock is

Photograph of quarry and sidehill plant, taken January 19, when the first big shot was fired. The plant shown here is the primary crushing and screening plant. The conveyor leading to the final screening plant comes out under the bin at the lower left-hand corner of the picture

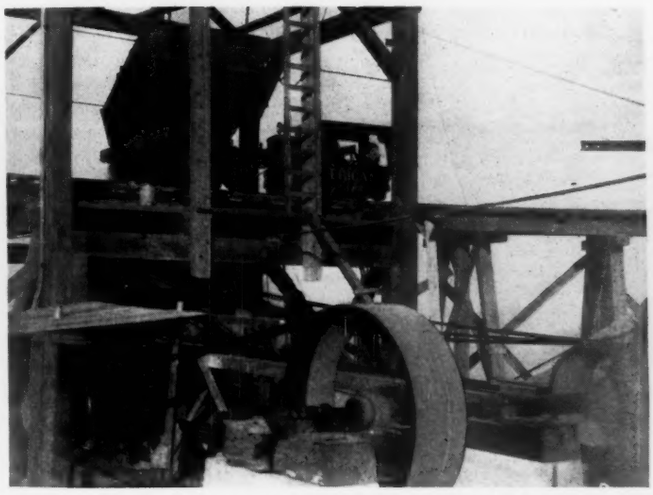
Left: The quarry and the storage hopper between the primary breaker and the scalping screen. Right: Quarry equipment showing type of car and locomotive used

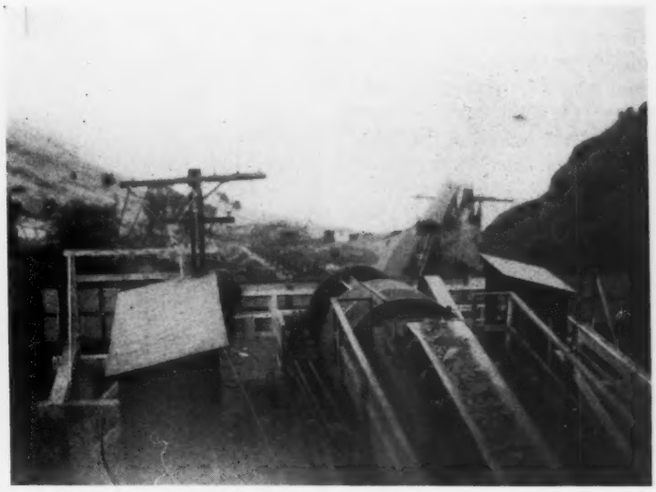
Both views were taken in the quarry after the big shot. The track leads around to the storage bin shown above

The finished product is brought by conveyor to this wharf where it is loaded on barges for transportation to Long Beach, across from Catalina Island



Left: Part of plant containing the primary crushers and screens. Right: The power plant which supplies power not only to the crushing plant but for the whole of Catalina Island. Oil engines and 2300-volt generators are used





Left: The car dump. In the foreground is the drive for the 60-in. Traylor jaw crusher. Right: Roller track feeder and ball-bearing belt conveyor feeding trunnion type manganese plate screen

Another view of the same barge loading arrangement which is shown on the opposite page, showing the 36-in. conveyor discharging on a barge

Left: End of screening plant and conveying system that takes the product to waterside storage and barges. Right: View of waterside storage system and barge loading arrangement

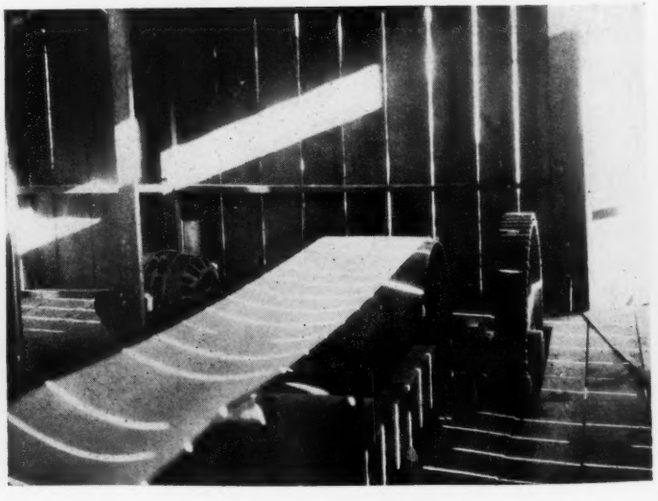
moved from the quarry to the primary breaker by an American gasoline locomotive in 6-cu. yd. side-dump cars. The cars are dumped automatically by a steel bail engaging the side of the car and being lifted by an 18x18-in. single-drum hoist. Each car is dumped into the 60-in. Traylor jaw crusher. By means of the single-drum friction hoist the entire load can be dumped quickly or partially depending upon the character of the rock. This primary breaker, set to 8 in., is operated at 120 r.p.m. by a 200-hp. slip-ring 440-volt, 3-phase, 60-cycle, 720-r.p.m. ball-bearing motor through a 20-in. belt and an American system of rope-drive, 1¼ in. diameter, with graphite center.

Crushing Plant

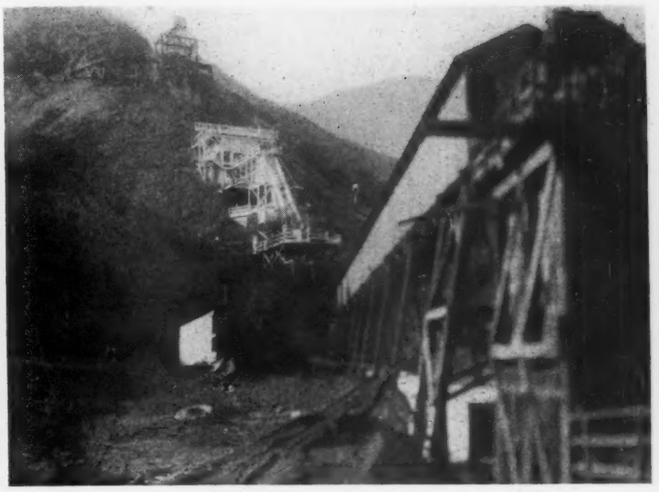
The crushed material, 8 in. and under, falls by gravity into a 1000-yd. storage hopper which was blasted out of the solid rock. A storage of this capacity permits absolute independence of quarry operation relative to the mill. At the bottom of this hopper is a 42-in. wide by 12-ft. centers, roller-track S-A apron feeder, which feeds the material to a 36-in. by 75-ft. centers belt conveyor. The apron feeder travels at a very low rate of speed, 10 f.p.m., giving a regular and even feed to the mill, which is necessary for accurate screening. The belt conveyor carrier is one of the recent ballbearing carriers known as 101X designed and manufactured by the Stephens-Adamson Manufacturing Co. for severe service. Both of these units are driven by a single 15-hp. ball-bearing, slip-ring motor.

Conveyor gallery and tripper

The head of the belt conveyor discharges the material into a 60-in. by 18-ft. style No. 10 S-A heavy duty trunnion type screen, with manganese steel plates of 3½-in. perforations and 8x8-ft. dust jacket of 1-in. perforations. This screen has a separate



Left: Direct driven conveyor which takes material from scalper screen. Right: Head and drive of the 338-ft. storage conveyor



Left: Gallery for 338-ft. storage conveyor. Right: Shows the entire plant with conveyor gallery and final screening plant in the foreground

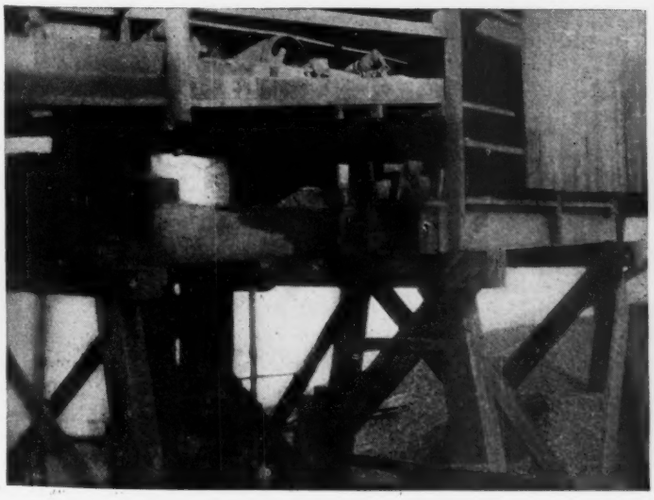
motor drive, 20-hp. ball-bearing slip-ring type. In this scalper screen three separations are made. The rock, 3½ in. and above, passes over the end of the screen and into a bin feeding the No. 7½ Telsmith reduction crusher. The material 1-in. size and under drops into a separate hopper as does the crushed rock between 1 in. and 3½ in. The fines mentioned above are conveyed from the bin under the screen to storage by a 24-in. by 70-ft. S-A style No. 71-C ball-bearing belt conveyor. Also, the material that passes the 3½-in. opening but is retained on the 1-in. perforation is conveyed to storage or bypassed to the No. 4 Telsmith reduction crushers depending upon the market. This rock is also moved on a 24-in. by 70-ft. S-A ball-bearing conveyor running parallel with the other. Both of these conveyors have separate direct geared motor drives, using 5-hp. ball-bearing squirrel-cage induction motors.

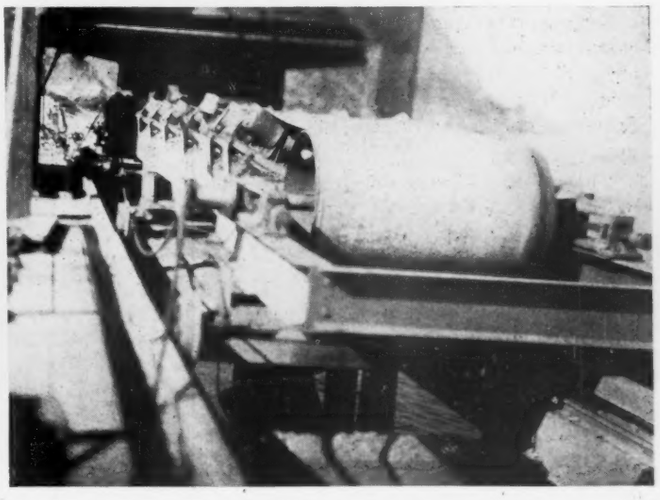
The oversize material from the scalping screen is fed by gravity into the No. 16 Telsmith gyratory breaker which is set with a 2½-in. discharge opening. The crusher operates at 275 r.p.m., having a capacity of approximately 130 cu. yd. per hour. This unit is belt-driven by a 75-hp. ball-bearing, slip-ring motor.

Conveyor which delivers to storage conveyor

The discharge from this breaker gravitates directly into an S-A secondary scalping, trunnion-type screen 48 in. diameter by 16 ft. long having 2-in. perforations. A 15-hp. ball-bearing squirrel-cage motor is used on this unit. Underneath this screen is a concrete bin built into the hill, of approximately 1000 yd. capacity, and divided into two compartments. The one compartment takes the "throughs," 2 in. and under, and the other takes the oversize from this screen and the rock that has passed through the 60-in. initial scalper above.

The rock in these bins and





Left: The tandem drive and gravity take-up of the 550-ft. conveyor. Right: The 50-ft. shuttle conveyor

View of Avalon, on Catalina Island, Calif., near which the plant is located

in this secondary crushed condition is drawn out by three 24-in. by 60-ft. centers S-A ball-bearing, belt conveyors. The one conveyor located in the center feeds the oversize to the two No. 4 Telsmith gyratory reduction crushers, whereas the other two convey the "throughs" direct into the final, revolving sizing screens. These conveyors being on the same center line as the crushers and passing under them also take the discharge from the reduction crushers.

These gyratories are set to 1¼-in. discharge openings and each has a capacity of about 60 yd. per hour. Both operate at about 325 r.p.m. and are driven by 60-hp. Fairbanks-Morse, ball-bearing, slip-ring motors.

The final separations are made in two 48-in. by 18-ft. S-A No. 9 trunnion type revolving screens at 14 r.p.m.. These screens have 10 ft. with 1-in. perforations, 8 ft. with 1½-in. perforations and a dust jacket 72 in. diameter by 8 ft. long with ¼-in. perforations. The drives on these screens are the same as on the secondary scalping screen.

Bin and Ground Storage

The screened rock is stored below in a bin of approximately 1000-yd. capacity and divided into five compartments. As rapidly as each of these compartments is filled the rock is drawn from them by a 24-in. by 60-ft. style No. 71-C ball-bearing, belt conveyor located in tunnel. The conveyor is fed by 15x18-in. S-A hinged cut-off gates. This unit discharges the rock to the tail end of the storage conveyor 24-in. by 338-ft. centers, which elevates the crushed material about 30 ft. above the ground. The material is tripped off this conveyor into the various stock piles by a style No. 41-A, S-A self-propelled, heavy, cast-iron-frame tripper. The total length of the storage pile is about 250 ft., and the estimated live storage is about 8000 yd.

The storage conveyor has a direct-cut, gear-drive, and is driven at the head end by a 25-hp. ball-bearing, slip-ring motor, the stretch of the belt is automatically adjusted by an S-A gravity takeup, placed behind the head pulley.

Inasmuch as the transportation of the crushed rock is done by barges or boats, it was necessary to provide a secondary storage near the ocean front of large enough storage capacity to provide for the barges or boats. The secondary storage pile is about 250 ft. long, and the same height as the preceding storage with a capacity of approximately 4000 cu. yd.

This secondary storage system consists of a 24-in. by 560-ft. centers S-A ball-bearing conveyor. The lower end of this conveyor for about 250 ft. is in a concrete tunnel under the long storage pile and is fed by a series of 15x18-in. S-A hinged cut-off gates, which are about 12 ft. on center.

The head end of this unit then rises about 30 ft. above the ground level and is horizontal for about 150 ft. At this section of the conveyor is another style No. 41-A S-A self-propelling tripper. This tripper stores the material in the different piles. This secondary storage system made the loading independent of the mill production and equipment.

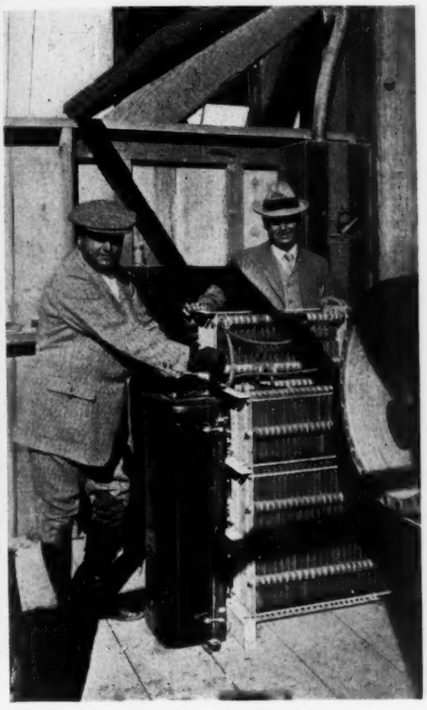
The drive for this long storage conveyor is a standard S-A tandem drive located on the return belt and approximately 150 ft. from the head end of conveyor. The countershaft is direct, gear-connected to a 35-hp. ball-bearing, slip-ring motor. To make adjustment for the elongation of this belt, directly behind the tandem drive is placed an S-A automatic gravity takeup.

Barge Loading

The next step is to load the barges or boats efficiently and with the minimum expenditure of time and labor. Located in the tunnel under this last storage is a 36-in. by 310-ft. S-A ball-bearing belt conveyor fed by a series of gates as mentioned above. About 150 ft. of this conveyor extends out into the ocean on a pier, while the other

portion is under the storage pile. The conveyor belt travels at about 400 f.p.m., and has a capacity of about 800 tons per hour. The conveyor is driven at the head end by direct, gear drive and a 20-hp. ball-bearing, slip-ring motor. Directly behind the head pulley is an S-A automatic gravity takeup.

At the head end of the pier and at right



William Wrigley, Jr., starting 200-hp. motor on the initial run of the plant, and G. M. Renton, general manager of the Santa Catalina Co.

angles to it is built a cantilever bridge which supports a 36-in. by 50-ft. center ball-bearing, belt conveyor. This shuttle conveyor takes the discharge from the head end of the preceding conveyor and loads the material directly into the barges. This conveyor being mounted on a steel frame and wheels is movable and distributes the crushed rock over the entire width of the barge. The shuttle is also driven directly through gears by a 5-hp. induction, ball-bearing motor. By this simple boat-loading equipment barges of 300-yd. capacities are loaded in an hour and then towed to the mainland.

General Summary

At the outset, Graham Brothers, Inc. and Stephens-Adamson Manufacturing Co. had the following cardinal points in view: (1) Flexibility; (2) Simplicity; (3) Standardization; (4) Minimum operating costs.

Flexibility—By means of the large storage bins between the different units only a small part of the mill production is crippled by a breakdown in any of the units. The quarry operations are entirely independent of the mill, and the mill in turn operates with no immediate dependence upon the storage system; and finally the same flexibility is maintained between the storage system and the shipping system. This elasticity makes the plant capacity variable from 1000 tons per 8 hr. upward.

Simplicity—From the foregoing description and photographs, it can be seen that the flow of the material is downward and forward until the final separations are made. The crushers are relieved of unnecessary wear by the scalping out of the undersize and bypassing the crushers. In the entire installation there is no troublesome and expensive elevator. All the material is moved either by gravity or belt conveyors.

Standardization—All motors are of one standard manufacture—Fairbanks-Morse & Co. and all of the transmission, screening and conveying machinery is Stephens-Adamson Manufacturing Co. design and manufacture. The drives for the different units are interchangeable, thus minimizing the numbers of repairs to stock. The belt conveyor carriers are all S-A ball-bearing, carrier rolls of unit construction. All belts on the installation are of S-A special specifications.

Minimum Operating Costs—The summation of the above points reduces to a minimum the operating cost. Belt conveyors are the most efficient units for moving material, being down for repair very rarely when compared to elevators. The upkeep on a belt conveyor is also very low. Especially when ball-bearing rolls of unit construction are used is this true. These require lubrication but once every 6 or 12 months, a casual inspection once a month. These ball bearings being in dust tight chambers, insure maximum life of bearings. With the low coefficient of friction in ball bearings, the power saving is approximately 25% and consequently a longer belt life is obtained. All the motors are of the self-aligning, dust-proof S.K.F. ball-bearing type, which call for an inspection but once a year.

Distribution of Products

The transportation of the crushed rock to the mainland is handled by the Graham Brothers, Inc. The material is shipped to San Pedro, Long Beach and other ports along the coast in barges or self-unloading boats. At these stations the crushed rock is unloaded by belt conveyor systems designed by Stephens-Adamson Manufacturing Co., into large storage piles or bunkers. By gravity, the rock is put into trucks for use in the immediate vicinity or into railroad cars for distribution to further points.

Graham Brothers, Inc. of Long Beach, are among the largest producers and distributors of crushed rock in southern California. Robert and Paul Graham, organizers of the corporation, began their activities in the construction of highways and general contracting 15 years ago, and to have an independent source of materials they have gradually added sand and gravel plants. To supply a superior product for construction purposes, complete rights for erection and operation of this modern rock crushing plant on Santa Catalina Island was obtained from William Wrigley, Jr., who, with other local financiers, is associated with the organization. The foresight shown by the directors of Graham Brothers, Inc. in this basic industry — stone products — has added much momentum to the rapid progress of southern California.

Wisconsin Concrete Products Association Meeting

ACCORDING to the Milwaukee *Sentinel* the Wisconsin Concrete Products Association will attempt to eliminate the air space clause in the present state building code because it holds it to be a figurative ball and chain around feet of concrete producers. It tends to restrain the outlying manufacturers from shipping their products to any distance because of weight expenses, according to officers of the association.

The two-day convention of the body at Hotel Pfister ended Friday, February 4, with the re-election of the following officers:

President, W. H. Carey, Wisconsin Rapids; vice-president, G. C. Yunker, and secretary-treasurer, D. R. Collins of Milwaukee.

W. C. Muehlstein, building engineer, Wisconsin Industrial Commission, was the chief speaker on the closing afternoon. His subject was the "Enforcement of the Wisconsin Building Code in 1924."

The speaker urged the enforcement of the code rigidly for the ensuing year.

"The work of enforcement of the revised concrete block requirements during the past several months has been rather passive," he said. "All producers have been informed of voids, branding and necessary tests. Time has been given to become adjusted. A real check up of all producers has been started during the last months, in which plenty of opportunity will be given the sincere worker to show proof of co-operation."

After Mr. Muehlstein concluded his talk the convention put up to him the proposition of eliminating the space clause in the present code.

The committee on testing recommended that more stress be placed on testing.

New California Gypsum Tile Factory

COMPLETION of the main factory building of the Pacific Gypsum Tile Co. of City Industrial Tract of Los Angeles, Calif., is announced this week by F. G. Kellogg, president of this concern. Kellogg is also president of the Kellogg Oil Co. W. G. Johnston, formerly of the Button-Lath Co., will act as general manager of the new tile plant.

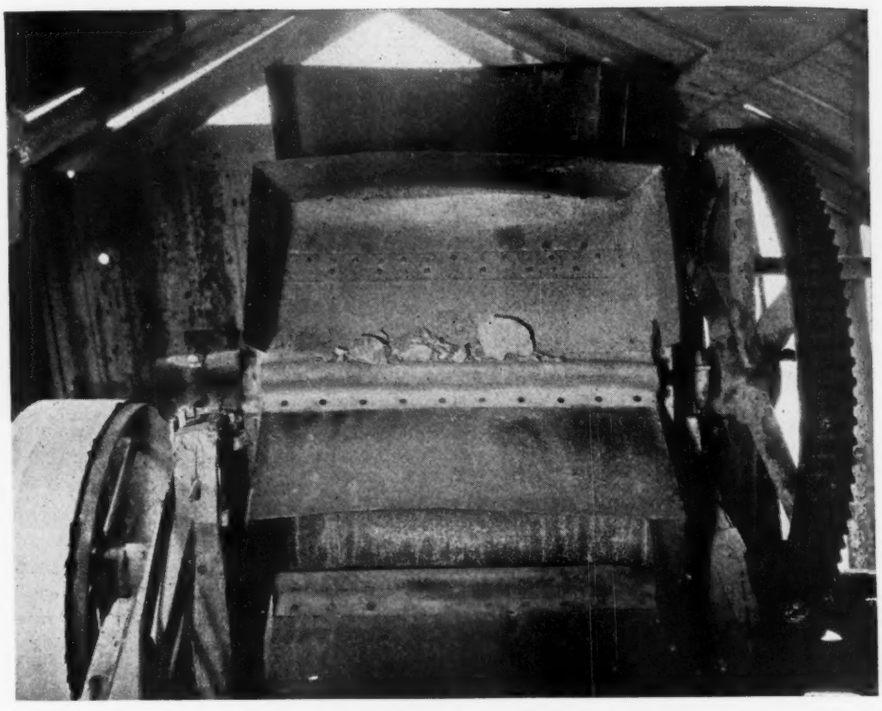
Three acres will be devoted to this industry and in addition to the present factory building, offices, kilns and a warehouse will be constructed. The tract is now served by spur from the Southern Pacific railroad.

Hints and Helps for Superintendents

The Stephens Elevator Belt Protector

THERE is no doubt but that plant and quarry superintendents use their brains to save labor, improve methods and to better the design of the machines they work with. You can see evidence of this in every plant you visit. In fact the writer, whose business has given him occasion to visit plants for a number of years, can testify that he never saw a plant in which there was not some "wrinkle" or some particular method or device that was well worth copying. This Hints and Helps page, in fact, is made up of just such good ideas that have come from the fertile minds of plant superintendents and their assistants.

But now and then one comes across a new device, or idea, that is so startlingly simple and so obvious a solution of a vexatious problem that one wonders why, with all the inventive and engineering talent that has been concerned, no one has thought of it before. Such a device is illustrated on this page. It is patented and placed on the market, and would ordinarily be described in the New Machinery and Equipment section. But it is so pat an illustration of good headwork on the part of a plant superintendent



The protector on the discharge side of the elevator. It is struck by the stones but the air cushion under it keeps it from injury

This shows the shape the protector takes as the belt starts to go over the pulley

and it shows so well the opportunity we all have to better and improve the simple things, that we use every day, that it has been included here.

This device is the invention of John Stephens, who is superintendent of the Hagersville quarry of the Canada Crushed Stone Corporation, Ltd. It is a protector for elevator belts and it has been thoroughly tested out in the company's plant and has shown a very substantial increase in the life of the belt and a considerable lessening of the operating time lost.

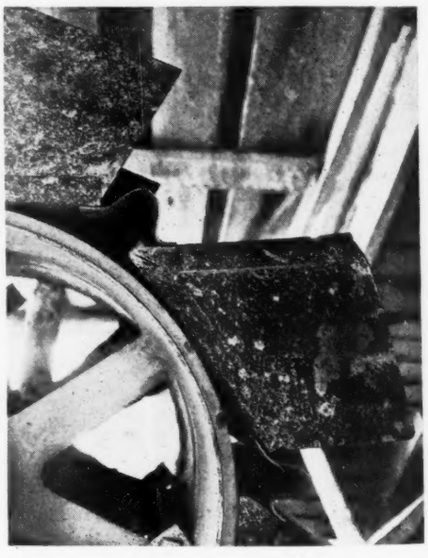
As the cuts that accompany this show, the device is merely a piece of light rubber fabric between the buckets of the elevator kinked in such a way that it will go over the pulleys without being subjected to any strain. This keeps any stones from falling between the bucket and the belt.

The sad effects of stones getting behind elevator buckets where they are pressed into the belt, is too well known to all plant operators to call for any comments. Probably ten belts are destroyed in this way to one that wears out by actual service.

In addition to the waste of belting there is the waste of time due to elevator repairs, which is usually the greater loss.

In one plant where these belt protectors were used there was an actual saving of time of 1½ hr. per day, due to the fact that before their installation the crushers had to be run slowly several times a day while a man clawed out the stones which had fallen behind the buckets, with an iron hook. The saving effected by the protectors in this plant was figured at from $60 to $100 per day.

Stones discharged from the bucket may



The protector between a bucket on top of the pulley and one on the side

strike the protectors, but owing to the air cushion formed behind it they do very little damage. Protectors in use for two months show very little wear, the outside

having the appearance of being merely rubbed.

The device is patented in Canada and patent has been applied for in the United States. It is manufactured by the Doolittle-Stephens Co., Hagersville, Ont., Canada.

Problems That Confront an Executive*

The Six Fundamental Divisions of Industrial Enterprises Discussed from the Modern Viewpoint

AN enterprise divides itself broadly into the following heads:

1. Engineering, in which is intiated the idea underlying the product, the scheme of the product itself and the methods of making it.

2. Production, which deals with the actual work, the machines and processes capable of turning out the product multiplied many times. Into this begins to enter the element of cost, for it must be considered not only how the production can be turned out, but how cheaply.

3. Sales. When the product is made, how can it be sold? This problem, which used to be left not so very long ago to the haphazard dealings of the loudmouthed, free-mixing salesman, is now rapidly becoming a question of scientific research. Modern merchandising methods are not always founded on sociability, but they are founded on a close study of the needs of the community, and the problems of distribution are very many and very serious.

4. Labor Problems. Curiously, these have become in the last few years totally distinct from prdouction problems. We are beginning to realize more than ever that we have a duty to labor. The old patriarchal idea which Carlyle writes about, and which obtained approximately during the middle of the last century, was that the workmen were children and the employer was a benevolent father who looked after them and provided them with the wherewithal; the children, however, had to do as they were told. Nowadays labor is demanding a partnership. The discussion is one that will go on for some years yet, but labor has to be dealt with every day on a newer plane.

5. Costs and Accounting. This is no mean problem: How shall we apportion our overheads? What does it cost to get the business? What does it cost to do the business? Are we getting enough for our product? How little can we take the business at and make a profit? And if we exceed that little, can we get the business?

6. Finance. This problem deals with the raising of the necessary money to start the business, to purchase the necessary workshop, the necessary tools, equipment, etc., to pay for the necessary help, the ever-pressing problem of the next payroll, the question of having bills paid promptly and of receiving money promptly.

*John Younger in a talk to students of Ohio State University.

These are the six main problems that confront the present executive. Perhaps his biggest problem is to choose lieutenants who will operate in each of those divisions successfully, satisfactorily, relieving him of the responsibility to a large extent, and yet being able to keep him in touch with what goes on so that he can correlate their various activities and build up what is known as an organization. An organization is the human machine which through a process of time has demonstrated its ability to function smoothly and efficiently. The men

Posts and bracing for supporting a bin

forming the organization, while working as units, dovetails into one another harmoniously so that without conscious effort they understand not only their own position but their position relative to the whole organization.

Detail of Bin Construction

THE detail of bin construction shown in the picture illustrates some interesting points in bin design, where wooden posts are used as supports. The use of a wooden post is considered good, as it utilizes wood in the way in which it has the greatest strength. The carrying up of the concrete foundation is also a good point. This reduces the length of the post and enables it to carry much more weight for the same least cross dimension. It also prevents injury to the posts from a car getting off the track. It is especially important in bins built for truck loading to carry the concrete high enough to have the posts out of danger and sometimes it is well to protect the corners of the concrete foundation by pieces of timber that may be removed if struck by the hub of the truck.

The posts in this case are set on a wooden "bolster" or sill. This is a practice not so much used as formerly. It puts the weight on the side of the fibres of the wood which is the way in which wood has the least resistance. The best of all methods for fastening the end of a post to a concrete foundation is to use a cast iron base plate. The bracing of the posts to the cap has the double purpose of holding the post rigidly and lessening the length of span to be supported.

Buying Centrifugal Pumps

IT is a good idea to buy machinery with more capacity than is wanted for the job, but this may be carried too far in buying a centrifugal pump. Let us suppose a case of a pump wanted to deliver 500 g.p.m. against 50-ft. head. If the buyer chooses a pump which will pump 500 g.p.m. to 100 ft. and buys his power unit accordingly, he will get much more than the 500 g.p.m. wanted at 50 ft. and he will use much more power than is needed. The pump designed for a high head will not work as efficiently for a low head. The only way to get economical service from a pump is to buy the size and type recommended by the makers for the particular conditions it must meet in its work.

If a pump has to be used to pump less water than it is designed to pump, the discharge and not the suction should be throttled down. Throttling the suction decreases the pipe line velocity and lessens the work demanded of the motor. But a throttled pump will not work as efficiently as one which works with an open pipe.

Direct connected pumps are in general use where electric power is obtainable. This is correct where the pump has to work against a constant head. But belted pumps have the advantage that the speed may be changed (by changing pulleys) so that the speed of the pump may be adopted to different heads.

A rough rule for finding the speed of a centrifugal pump is to multiply the square root of the head (including friction head, etc.) by 8.5. This gives the peripheral speed of the runner which may be changed into g.p.m. by dividing by the circumference of the impeller.

"Mud Shell" for Texas Cement

AS is well known, the Texas Portland Cement Co. of Houston, depends upon shells dredged from the gulf for its supply of lime. Concerning this a Houston paper says:

Figures of the State Game, Fish, and Oyster Department show that in the year up to August 31 last, 829,380 cu. yd. of mud shell were dredged and used for making cement. This brought a tax to the state totaling $41,469. The tax is 5 cents a cubic yard. A cubic yard weighs one ton.

Cities and counties of the state in the same period used 135,750 cu. yd. on roads. The material is said to make excellent roads. It is ground into gravel and is said to be superior to crushed rock.

A Rapid Hardening Slag Cement

French Cement Manufacturers Are Introducing a Cement Which in Two Days Has the Strength of Portland Cement in Seven Days

By "R. M." in Revue des Materiaux de Construction et de Travaux Publics
Translated by C. S. Darling, Former Editor of Rock Products

FOR a long time the engineers of the city of Paris public works have been busy reducing to a minimum the blocking of the highways. To attain this result they have expressed to cement manufacturers their desire to have at their disposition special cements of high initial strength; in their minds this cement should permit the speeding up of these works everywhere where too long a duration of the hardening of the cement is an inconvenience.

These qualities of rapid hardening ought to be specially interesting for sewer work, for pavement foundations and the construction of concrete highways which form the present program.

The solution of this problem appears today to be within sight, thanks to the studies of M. Pierre Prevost, technical engineer of the Societe Generale des Chaux et Ciments (Lime and Cement Association), which have resulted in the manufacture industrially of the "rapid setting slag cement" in the Louvieres factory at Vitry-le-Francois.

This special cement is known as the "Louve" brand, and it has been studied for two years in the laboratories of Societe Generale des Chaux et Ciments, and these studies have been completed by experiments conducted in the official laboratory of the city of Paris.

The characteristics of the rapid setting slag cement are as follows:

Chemical composition normal.

Slow setting.

Rapid hardening.

Increased strength at 24 hr., 48 hr. and 7 days.

Progressive increase of strength with no period of falling off in strength.

Moderate price.

CHEMICAL COMPOSITION—AVERAGE ANALYSIS

	Per cent
Combined silica	24.2
Siliceous sand	1.2
Alumina	13.8
Peroxide of iron	1.6
Lime	46.3
Magnesia	2.4
Sulphuric acid	0.9
Unspecified	9.6
	100.00
Hydraulic Index	0.83

FINENESS OF GRINDING

	Per cent
On 900 mesh screen (75 mesh American), residue	1
On 4900 mesh (175 mesh American)	10

Apparent density, 0.880
Deformation at 100 deg. (C), 1 millimeter

Length of Set—The set commences to be effective five hours after the addition of the water, and is completely finished at 8 to 15 hr.

STRENGTHS OF RAPID HARDENING SLAG CEMENT

	Tensile Strength														
	Neat Cement						Dry Mortar 1/3						Wet Mor. 1/3		
	24 hr.	2 days	7 days	28 days	3 mos.	6 mos.	24 hr.	2 days	7 days	28 days	3 mos.	6 mos.	2 days	7 days	28 days
Rapid Hardening Slag Cement (Louve brand)															
(Kg. per sq. cm.)	17	24	29.7	32	36.5	40	13	18.6	27.5	31.3	34.5	35	15	20.3	25.5
(Lb. per sq. in.)	238	336	415	448	511	560	182	261	385	438	483	490	210	284	357
Ordinary Slag Cement. City of Paris specifications															
(Kg. per sq. cm.)	....	7	20	26	28	30	....	6	16	25	29	32			
(Lb. per sq. in.)	....	98	280	364	392	420	....	84	224	350	406	448			

COMPRESSIVE STRENGTH

	Dry Mortar 1/3	
	7 days	28 days
Rapid Hardening Slag Cement (Louve brand)		
(Kg. per sq. cm.)	125	160
(Lb. per sq. in.)	1750	2240

From these figures it is seen that the rapid hardening slag cement gives at two days the strength required by the city of Paris for ordinary cement at seven days, and at seven days it gives the strength required at 28 days.

The strengths desired for the special cement by the standardization commission are obtained at two days instead of seven, and at seven days instead of 28 with the Louve rapid setting slag cement.

Crushing Strength

At the request of the city of Paris engineers, experiments were conducted on the strength of this Louve quick setting cement at the municipal laboratory, 2 Place Denfert-Rochereau, with a view to comparing its strength with the strengths of ordinary slag cement and with artificial portland cement.

We have obtained the results of these experiments, and give them below.

The cubes used for these experiments were 20 cm. (8 in.) on a side. The curves show the strength in kilograms per square centimeter. (Note: To get the approximate equivalent in pounds per square inch, multiply the values given by 14.—Editor.)

The slag cement V. P. and the artificial portland cement V. P. used for these experiments came from the most reputable French concerns.

It will be noted how positive are the results given by the Louve slag cement concerning rapid hardening. At 48 hr. the strength values are three to four times greater than for the common slag cement.

In comparing the figures of the above tables, it is seen that the mix with 150 kg.

COMPARISON OF MORTARS

1. Composition of the mortar: 150 kg. (330 lb.) cement
1 cu. meter (1.4 cu. yd.) gravel, 20 to 40 mm. (13/16 to 1⅝ in.)
½ cu. meter (0.7 cu. yd.) sand

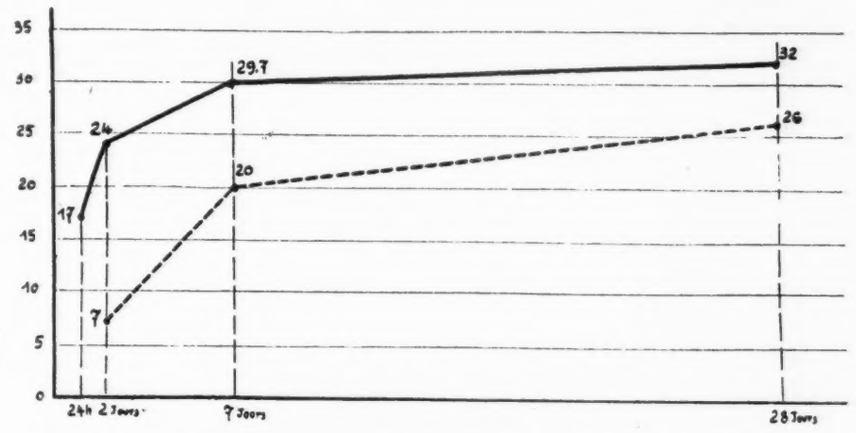
	18 hr.	24 hr.	48 hr.	7 days
Louve rapid hardening slag cement				
Kg. per sq. cm.	3	5.2	18.5	27.5
Lb. per sq. in.	42	72.8	259	385
Common slag cement, V. P.				
Kg. per sq. cm.	....	2.7	4.2	21.9
Lb. per sq. in.	....	37.8	59	306
Artificial portland cement, V. P.				
Kg. per sq. cm.	....	....	9.0	21
Lb. per sq. in.	....	....	126	294

2. Composition of the mortar: 350 kg. (770 lb.) cement
1 cu. meter (1.4 cu. yd.) crushed gravel
½ cu. meter (0.7 cu. yd.) sand

	18 hr.	24 hr.	48 hr.	7 days
Louve rapid hardening slag cement				
Kg. per sq. cm.	7.9	9.7	18.8	38
Lb. per sq. in.	110	135	263	532
Common slag cement, V. P.				
Kg. per sq. cm.	3.2	4.2	6.2	25
Lb. per sq. in.	45	59	87	350

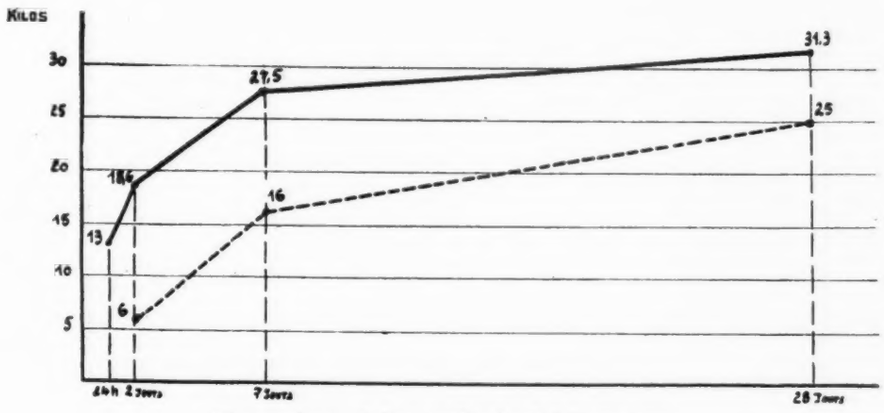
of Louve cement gives strengths greater than a mix with 350 kg. of common slag cement.

We will not stress the economy that will result with the Louve cement for the making of lean mortars. The high initial strength and the rapid hardening of the mortars obtained even with the very lean mix of 150 kg. will surely attract the attention of engineers and manufacturers.



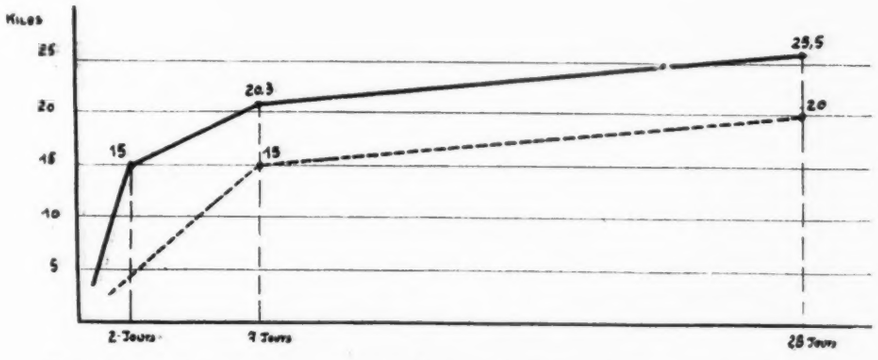
Comparison between rapid setting slag cement and tensile strengths required by City of Paris for common slag cement

[Heavy line is rapid setting slag cement. Strengths are in kgms. per cu. cm. and..... correspond to 238, 336, 415 and 511 lb. per sq. in. and 98, 280, and 360 lb. per sq. in. for common slag cement]



Comparison of dry, well mixed 1-3 mortars

[Heavy line is rapid setting slag cement mortar and dottde line is another slag cement of ordinary quality. The strengths are for 24 hr., 2 days, 7 days, and 28 days and should be multiplied by 14 to convert to lb. per sq. in.]



Comparison of 1-3 mortars made with rapid setting slag cement and a high quality of ordinary slag cement

[As above, the strengths are in kgms. per sq. cm. for 2 days, 7 days, and 28 days and should be multiplied by 14 to convert to lb. per sq. in.]

The rapid hardening slag cement will enable them to realize important economies of cement while taking advantage of the rapid hardening. Besides this, it is of interest to the manufacturer to dispose of a cement giving at 48 hr. and at 7 days results superior to portland cement, with a lower production cost, the selling price for the rapid hardening slag cement being below that for artificial portland cement.

Uses of Rapid Hardening Slag Cement

1. Street Work—The exceptional qualities of this cement have been particularly appreciated in highway construction on the boulevards of Paris where the rapid hardening permits the resumption of traffic after five days, instead of the minimum of 10 days prescribed for other cements.

We point out that in the wood paving work of the city of Paris, several thousand square meters of foundation have been built with the very lean mixture of 150 kg. per cubic meter of mortar, and that the streets have been opened to traffic after four or five days, to the satisfaction of all, thanks to the rapid hardening of the Louve cement.

2. Masonry Work. Making of Concrete Products—This cement can be used with complete success for the making of sewer passageways and canals, as well as for the making of concrete products with sand and gravel base, where its lower price makes it of interest.

The city of Paris uses this cement in the difficult parts of the metropolitan (subway) in the Saint-Germain district.

The rapid hardening slag cement presents no particular difficulties in its use. It is treated in the mixing like a common slag cement, and can be worked with trowel or in molds.

This cement considered specially for the new requirements (rapid paving of cities, concrete highways, more rapid production of massive concrete) is certainly called upon to play an important part in the program of work contemplated by the Ponts et Chaussees (Department of Bridges and Highways).

Important experiments are being carried on in various places for the purpose of showing all the advantage to be obtained from the rapid hardening of this cement for the making of concrete roads and as binder for the macadam of roads, work which is actually on hand and which occupies the attention of all the engineers of the Ponts et Chaussees.

We shall present an account of these experiments in a later paper.

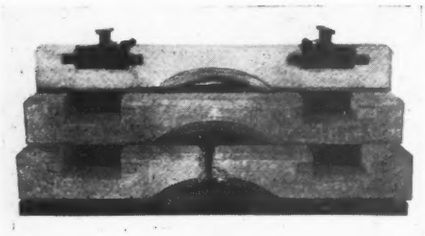
The rapid setting slag cement is manufactured by the Societe Generale des Chaux et Ciments at Vitry-le-Francois (Marne).

The method of manufacture is covered by patents.

Shearer concrete ties used in the D. T. & I. railroad. They have also been tried on the S. P. and other railroads

Concrete Railway Tie as a Crushing Plant Byproduct

CONCRETE PRODUCTS are appealing more and more to the operators of sand, gravel and crushed-stone plants as a possible outlet for surplus material, and as a possible manufacturing operation to increase the value of their raw materials. But ordinarily the concrete products business is too much of a picayune business—too many one-horse operators to compete with—to appeal to a large producer of stone, gravel or sand.



Construction of the tie

Only such branches of the concrete products business as hold out the possibility of big production—and the economies and cost-saving incident to big production—appeal to the ordinary business man. Concrete brick is such a commodity; and its manufacturer is more and more gravitating to large sand and gravel plant operation.

Concrete railway tie manufacture would be such an operation, if a tie could be perfected and the railways demanded it. The latest of many attempts to make a successful concrete railway tie is that of F. C. Shearer, of Eagle Pass, Tex., a former locomotive engineer, with an inventive and constructive genius. His tie is illustrated herewith; and according to competent authorities, offers interesting possibilities.

Sand, gravel and stone plant operators can look forward with some degree of assurance that if concrete ties are adopted by the railways, they (the producers) are the logical ones to make ties on a large scale. How far distant in the future such a business may be is hazardous to guess; but wood ties are getting constantly scarcer and higher priced; and a substitute must eventually be found.

Shearer's ties have been tried out on short stretches of the Southern Pacific, the Detroit, Toledo & Ironton, and other railways and are reported to be giving satisfactory service. One problem the railways have to face is buying them on a basis competitive with wood ties. To get them on such a basis necessarily involves their manufacture on a large scale from cheap aggregates—the stone, gravel and sand plant operator is the one to meet these conditions.

A model of this tie was exhibited at the National Crushed Stone Convention in St. Louis recently and attracted considerable attention. The introduction of such a tie would furnish a considerable market for screenings.

A Letter from Japan — Bright Outlook for Cement Industry

ROCK PRODUCTS readers may recall an article in our issue of April 22, 1922, on the Asano Cement Co. plants in Japan. This company's newest plant, at Kawasaki, was designed and built by Paul C. Van Zandt, chief engineer of the company. His right-hand assistant in the preparation of the plans was John A. Roberts, an engineer of the Allis-Chalmers Mfg. Co., Milwaukee, Wis. The Kawasaki plant was practically destroyed by the recent earthquake. The editor has received the following letter from Mr. Roberts, who has many friends and acquaintances in this country:

"I was in Tokyo at the time of the earthquake, and sure had some thrills; but fortunately escaped without any injuries. Our office building was practically destroyed, but did not collapse, for which I was thankful, as I was on the third floor and it's a long way to the ground—and take chances on being on top of the heap.

"My family was at Omori and all escaped injury except my little girl who was taking a bath at the time. It's a wonder she got out alive, with the ceiling, gas heater, medicine cabinet and falling glass coming down on her, but she escaped with a large black and blue spot on her back. She was delirious for about four hours; otherwise she was all right.

"When I left Tokyo on the 12th of September it was nothing but an ash heap with a lot of gutted modern office building standing.

"Today (December 16) it looks like a new city. I was surprised at the change in the place in such a short time as I arrived back here the 23rd of November. But everything is of light framing and corrugated iron and nothing of a permanent nature.

"It looks bright for the cement industry, as I expect that when they start to rebuild it will be with steel and concrete or reinforced concrete.

"It's hard to say just which is the best construction to withstand these earthquakes, for in some instances the reinforced-concrete buildings collapsed and in others they stood without a crack. And the same with the steel and concrete; while none of them collapsed, some were badly cracked and shattered and others did not show signs of cracks. It seems that the quake hit harder in some places than it did in others, and it's hard to tell whether it's the nature of the ground or style of foundation that saved some of these buildings."

Ground Hog Prospects for Gravel and Finds Workable Deposit

GRAVEL thrown out of a burrow by a ground hog gave a clew to a good deposit of road gravel inside the city limits of Marshalltown. The owner of the land saw the gravel, dug a hole himself and found a considerable deposit, and then called upon the gravel finding department of the highway commission to make a test. The gravel was found to be of good road surfacing quality, some 3 ft. in thickness, and is now being used for gravel surfacing the Marshalltown-Marietta road. — *Iowa Service Bulletin.*

Output of Portland Cement in January, 1924

THE statistics shown in the following tables issued by the Department of the Interior, and prepared under the direction of Ernest F. Burchard, of the Geological Survey, are based mainly on reports of producers of portland cement but in part on estimates. The estimates for January, 1924, were made necessary by the lack of returns from two plants. Production appears to be the highest recorded for any January; shipments are highest for the month except January, 1923, and stocks have been exceeded only a few times, as for instance early in 1916 and 1922.

The Bureau of Foreign and Domestic Commerce, of the Department of Commerce, reports that the imports of hydraulic cement in December, 1923, amounted to 104,422 bbl., valued at $170,941. The total imports in 1923 amounted to 1,678,636 bbl., valued at $2,964,098. The imports in December were from Belgium, 64,257 bbl.; Denmark, 20,172 bbl.; Norway, 15,424 bbl.; Sweden, 2782 bbl.; Canada, British Columbia, and Yukon, 834 bbl.; Quebec and Ontario Provinces, 298 bbl.; France, 554 bbl.; England, 101 bbl. The imports were received in the following districts: Los Angeles, 57,168 bbl.; Porto Rico, 20,172 bbl.; New York, 15,936 bbl.; Florida, 4552 bbl.; San Francisco, 3562 bbl.; Massachusetts, 1025 bbl.; Washington, 834 bbl.; Galveston, 774 bbl.; other districts, 399 bbl.

The exports of hydraulic cement in December, 1923, were 80,487 bbl., valued at $227,912, of which was sent to Cuba, 42,135 bbl.; to the other West Indies, 5218 bbl.; South America, 13,409 bbl.; Mexico, 10,099 bbl.; Central America, 6026 bbl.; Canada, 1381 bbl.; and to other countries, 2219 bbl.

The statistics of imports and exports of hydraulic cement in January, 1924, are not available.

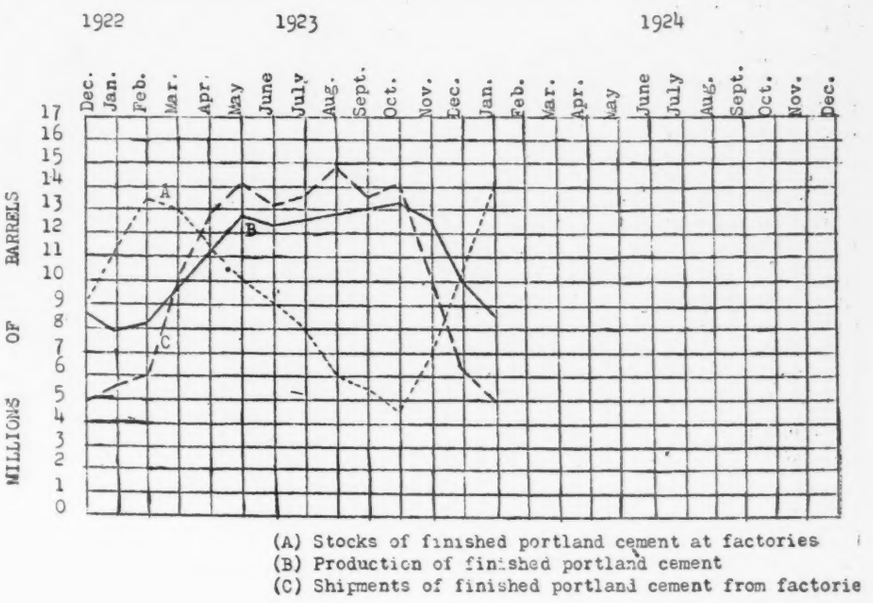
IMPORTS AND EXPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1922 AND 1923, IN BARRELS*

	Imports		Exports	
Month	1922	1923	1922	1923
January	17,039	71,686	70,725	74,169
February	5,157	20,529	82,421	88,531
March	1,597	66,521	103,556	98,861
April	10,855	76,899	75,412	85,662
May	2,524	88,480	100,068	103,634
June	14,198	111,559	96,263	77,203
July	957	286,106	119,491	82,774
August	56,757	324,008	105,156	73,201
September	†42,641	215,785	78,615	77,121
October	§65,228	172,051	80,402	74,302
November	61,010	140,590	108,798	85,743
December	45,860	104,422	106,938	80,487
	323,823	1,678,636	1,127,845	1,001,688

*Compiled from records of the Bureau of Foreign and Domestic Commerce. †Covers period September 1-21. Imports September 22-30 included with October. §Includes imports period September 22-30.

Stocks of clinker, or unground cement, at the mills at the end of January, 1924, amounted to about 5,460,000 bbl. compared with 3,783,000 bbl. (revised) at the beginning of the month.

[The above record shows a fairly close correspondence between January, 1923, and January, 1924. The January shipments of 1924 are 92.5% of those of January, 1923. Stocks on hand, however, have increased.]


1922
1923
1924
Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
MILLIONS OF BARRELS
17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
A
B
C

(A) Stocks of finished portland cement at factories
(B) Production of finished portland cement
(C) Shipments of finished portland cement from factorie

Shipments, manufacture, and stocks of portland cement

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN JANUARY, 1923 AND 1924, AND STOCKS IN DECEMBER, 1923, IN BARRELS

Commercial district	Production—January 1923*	Production—January 1924	Shipments—January 1923*	Shipments—January 1924	Stocks at end of January 1923*	Stocks at end of January 1924	Stocks at end of December 1923*
Eastern Pa., N. J. & Md.	2,143,000	2,382,000	1,099,000	1,384,000	3,289,000	2,830,000	1,832,000
New York	311,000	459,000	128,000	189,000	699,000	923,000	653,000
Ohio, W'n Pa., & W. Va.	671,000	779,000	405,000	360,000	1,043,000	1,481,000	1,061,000
Michigan	173,000	299,000	172,000	196,000	632,000	813,000	710,000
Ill., Ind. & Ky.	1,277,000	1,346,000	974,000	635,000	1,717,000	2,259,000	1,549,000
Va., Tenn., Ala. & Ga.	542,000	696,000	482,000	523,000	222,000	631,000	457,000
Eastern Mo., Ia. & Minn.	1,081,000	960,000	555,000	296,000	1,977,000	2,519,000	1,855,000
W'n Mo., Neb., Kan. & Okla.	380,000	394,000	433,000	278,000	885,000	1,259,000	1,143,000
Texas	372,000	314,000	353,000	287,000	210,000	305,000	278,000
Colo. & Utah	78,000	61,000	86,000	70,000	169,000	260,000	269,000
California	792,000	922,000	825,000	898,000	209,000	373,000	350,000
Ore., Wash. & Mont.	170,000	176,000	116,000	94,000	425,000	500,000	418,000
	7,990,000	8,788,000	5,628,000	5,210,000	11,477,000	14,153,000	10,575,000

*Revised.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1923 AND 1924, IN BARRELS

Month	Production 1923	Production 1924	Shipments 1923	Shipments 1924	Stocks at end of month 1923*	Stocks at end of month 1924
January	*7,990,000	8,788,000	*5,628,000	5,210,000	11,477,000	14,153,000
February	*8,210,000		*6,090,000		13,596,000	
March	9,880,000		10,326,000		13,045,000	
First quarter	26,080,000		22,044,000			
April	11,359,000		12,954,000		11,463,000	
May	12,910,000		14,257,000		10,144,000	
June	12,382,000		13,307,000		9,168,000	
Second quarter	36,651,000		40,518,000			
July	12,620,000		13,712,000		8,081,000	
August	12,967,000		14,971,000		6,080,000	
September	13,109,000		13,698,000		5,533,000	
Third quarter	38,696,000		42,381,000			
October	13,350,000		14,285,000		4,612,000	
November	12,603,000		10,251,000		6,991,000	
December	9,997,000		6,408,000		10,575,000	
Fourth quarter	35,950,000		30,944,000			
	137,377,000		135,887,000			

*Revised.

Iowa Stone Producers Meet

Third Annual Meeting of the Iowa Stone Products Association at Cedar Rapids

THE third annual meeting of the Iowa Stone Products Association was held at Cedar Rapids, Iowa, on February 11. As notices were mailed the members only four days previous to the meeting, and as some of the members were in California, the attendance was not so good as usual.

The morning of February 11 was spent in informal discussion and at noon the members adjourned for luncheon.

At 2 p. m. the formal session was opened by the usual reports and reading of minutes. A discussion followed as to the advisability of raising the dues of the association, but it was finally decided to leave them as they are at present.

Permission had been obtained from H. C. Rockwood of Rock Products to make and distribute to members of the association copies of cost data which had been compiled by Mr. Rockwood and copyrighted by him, and the secretary distributed these cost data sheets to all present.

There followed a discussion of new officers, President Van Winkle suggesting the officers be changed and that J. F. Schroeder be nominated president for the year 1924. Mr. Hands suggested that all officers with the exception of the secretary be changed and that the retiring president be made a delegate to the next meeting of the National Crushed Stone convention in 1924. It was then moved by Mr. Schroeder and seconded by C. V. Ray that officers who served during 1923 be re-elected for 1924, which motion carried.

Next there was a discussion on the question of rate reduction to appoint a committee to look into the matter of doing away with the 80% which is now in effect and to put the rates on a basis of straight mileage.

Mr. Ray advised that the Sand and Gravel Association had a committee working on this question and as soon as information was obtained by them he would pass it on to the secretary of our association.

R. N. Van Winkle then gave a report on the National Crushed Stone convention which was held in St. Louis January 21 to 23, inclusive.

Next followed a short summary of a talk given by Fred White at the Iowa Engineering Society convention by Mr. Hands on the work of the highway commission and its work and difficulties as regards the road building program for Iowa, after which there was a general discussion by all members present regarding the road building outlook for Iowa.

The secretary was then instructed to get in touch with the following companies extending to them an invitation to join this association.

R. N. Campsey, Northwestern Gravel Co., Des Moines; Bartlett & McFarland, Waterloo; Ulrich-Paley Co., Dubuque; Tom Welsh, Dubuque; Ideal Sand and Gravel Co., Mason City; Dolese Bros., Chicago.

It was suggested by Mr. Schroeder that the association hold meetings more frequently during the year in order to keep up the interest in the organization and this suggestion was endorsed by all, it being decided that they would hold meetings quarterly.

R. N. Van Winkle

The meeting adjourned with selection of date and place for the next meeting left to the president.

Those who were present were:

Paul Nauman, president, Eagle Point Lime Works; Stanley Hands, vice-president, River Products Co.; R. N. Van Winkle, secretary and treasurer, Hawkeye Quarries Co.; Will Dearborn, H. Dearborn's Sons; Frank Dearborn, H. Dearborn's Sons; J. F. Schroeder, Linwood Cement Co.; C. V. Ray, Peru Stone and Cement Co.

A. H. Monohan of the DuPont Powder Co. and J. M. Ferguson of the Hercules Powder Co. were present as guests of the association.

Kentucky Crushed Stone Plant to Be Enlarged

COL. T. B. RIPY, of Lawrenceburg, Ky., was in Lexington Saturday conferring with County Road Engineer W. H. Edwards and telling him of the extensive improvements in his rock-crushing plant at Tyrone, which are now under way.

Col. Ripy stated that these improvements, which consist of enlarging the plant, installing new machinery, such as crushers, screens and elevators for loading cars, would increase the capacity of the plant from 10 cars of crushed rock per day to 40 cars per day.

Col. Ripy some time ago purchased a tract of land from Joseph Wolf, just west of the old Pepper distillery, near Lexington, which is underlaid with a substrata of limestone rock, but he says that he will not open a quarry at this location yet, but will confine his activities to improving his Tyrone plant.—*Lexington, Ky., Leader.*

Tampa Rock Company's New Plant

ONE of the most important forces ever felt in the Tampa construction world came in 1923 with the establishment in this city of a $100,000 rock crushing plant known as the Tampa Rock Co. It is the only concern of its kind here and has lessened the distance necessary to obtain rock products by at least 35 miles. Contractors are also able to haul or have the material delivered directly from the company's bins, instead of buying in carlots from out-of-town dealers and thus incurring heavy demurrage losses. The Tampa Rock Co.'s supply is from the unlimited beds of Florida flint rock, some 50 miles from here. Judging from the success of this nine-months-old firm, Tampa contractors appreciate its advent.—*Dixie Manufacturer.*

Alabama Making Heavy Tonnage of Fertilizer

ACCORDING to the *Philadelphia Public Ledger,* Alabama fertilizer plants are preparing to make a heavy tonnage of fertilizer this spring, which, of course is good news for the producers of phosphate rock. The paper says:

"Ten thousand cars will be required to move the output of fertilizer plants in Montgomery, Ala., during the first four months of 1924 if the estimate compiled from figures submitted by the seven local manufacturers is accurate. By the middle of April 250,000 tons of fertilizer will have been manufactured in Montgomery, according to this estimate, a 25% increase over 1923. All fertilizer marketed in Alabama this year is to be of a higher grade than that of former years."

The above is only one of many indications of increasing demand for phosphate rock.

Shipped More Than a Million Tons of Slag in 1923

LAST year the Birmingham Slag Co. shipped 25,905 cars of basic slag from its plants at Ensley and Alabama City and into southern construction, general road and bridge, went more than 1,000,000 tons.

The Birmingham Slag Co., the pioneer in the South in reclaiming slag from industrial waste piles for the commercial market, is now shipping from their two modern crushing and screening plants 6000 tons per day of a scientifically prepared product known as "Ensley basic slag" and "Alabama City basic slag" to six states in the Southeast for use as coarse aggregate in reinforced concrete structures and as road metal in all types of good roads and street pavements, in the wearing surface as well as base construction.

Blast furnace slag 12 years ago was seldom, if ever, included by specification writers in the Southeast in the list of permissible coarse aggregates for reinforced concrete structures. Today it is included in practically every specification on a parity with other coarse aggregates throughout the Southeastern states. In all laboratory and field comparative tests of slag, stone and gravel, slag concrete has invariably tested higher in both compression and tensile strength. In substantiation of this statement the slag company refers us to the report of the United States Bureau of Public Roads made to the American Society for Testing Materials at its annual meeting held in Atlantic City last June.

Crushed and screened blast furnace slag is being used today throughout the United States in all classes of concrete construction where its availability makes its use economical. It has been the preferred coarse aggregate for plain and reinforced concrete in Germany, France and England for the past 50 years.

Hundreds of thousands of tons have been used in concrete buildings in Atlanta and several of the other Georgia cities and in over 100 miles of state and federal-aid roads and bridges in this state. Of the 51 slag concrete buildings in Atlanta alone, the following are a few of the most important: Federal Reserve Bank building, Coca Cola factory, Atlanta cotton warehouse, Transportation building, Ansley hotel annex, M. Rich & Bros. Co. department store, Glenn Estate office building, Atlanta-Biltmore hotel, Howard, Metropolitan and Rialto theaters, Geo. Muse Clothing Co. building and six Emory University buildings.

The new terminal station at Macon, Ga., and also the one at Jacksonville, Fla., are other outstanding monuments to slag concrete.

Some of the more important reinforced slag concrete buildings in Birmingham in which "Ensley basic slag" has been used are: Million dollar Masonic Temple, Birmingham *News* building, Birmingham Trust and Savings bank, Jemison Real Estate building, Louise Pizitz department store, Loveman, Joseph A. Loeb department store annex, Woodlawn high school, municipal market, Altamont apartments, Tennessee Coal, Iron & Railroad Co.'s general hospital, Moore-Handley Hardware Co.'s warehouse, Birmingham Ice and Cold Storage and Collins Wholesale Grocery Co.

As is evidenced by the above list of imposing reinforced concrete structures, the leading architects in New York as well as in the South recognize the quality in "Ensley basic slag" and "Alabama City basic slag" and show no hesitancy in including these superior coarse aggregates in their specifications.

"SlagTex face brick," a concrete product, is the latest, as well as most beautiful, product manufactured from slag by this company. Over 6,000,000 "SlagTex" brick were used in all classes of buildings during 1923. The demand has become so great that additional machines have just been installed in the big Ensley plant in anticipation of a 12,000,000 brick business in 1924. A concrete hollow tile machine is also being installed to meet the demand of the architects and contractors for a hollow building tile that will not be warped and uneven to assure best results in plastering interior walls and stuccoing exterior walls.—*The Dixie Manufacturer.*

High Value of Slag in Great Britain

THE present status of blast-furnace slag is a striking example of the working of modern methods in the transformation of industrial waste products into materials of high value and great demand. British blast-furnace owners are now reaping profits from the big slag heaps which have been accumulating as waste for many years. At a meeting of foundrymen at Manchester it was said that pig iron can now almost be described as the byproduct—there being little or no profit in it—while the slag is the valuable material that is in demand.

About 10 years ago, road builders began buying slag as a substitute for granite. The slag is first crushed and then mixed with tar. The Stanton Iron Works, Manchester, is selling 40,000 tons of slag per month; and 20,000 tons of it is treated with tar. Four years ago there were slag heaps at the Stanton plant made up of 5,000,000 tons of this erstwhile waste product, and these have been so reduced in the meantime until today only 250,000 tons is left.—*Compressed Air Magazine.*

Death of B. L. Knowles

B. L. KNOWLES, manager of the publicity department, Worthington Pump and Machinery Corporation, died February 14, 1924, from cerebral hemorrhage, after six days' illness.

Mr. Knowles was only 43 when he passed away but he had been with the Worthington corporation for 28 years—the only firm he ever worked for.

He was well known in advertising circles and took an active part in the various associations whose object was to place advertising on as high a plane as possible.

Mr. Knowles is survived by his widow and two sisters. His club memberships included Technical Publicity Association, National Industrial Advertising Association, Mayflower Society.

The Way to Help

JOHN H. JONES, president of the Bertha Consumers Coal Co., in the *New York Commercial,* gives the following excellent advice as to rail shipments, which, if heeded, will help to make 1924 one of our greatest years in our industrial history:

"Every business man in this country and every good citizen should do everything possible to help the railroads by loading and unloading cars promptly. They should urge upon their representatives in Congress to give railroad legislation a rest—give the railroads opportunity to get on their feet. I have been in constant touch with railroad officials for more than 40 years and never in its history have we had better management of railroads than we have today. Give this management a chance. Don't continually nag them. Help them.

"Let us have more helpful legislation and less continued dragging on the wheels of industry by our legislators and statesmen. The buying power of our railroads at present is somewhat limited, while in most other lines it is free. If our political situation, as it affects the railroads, becomes stabilized, and investors show confidence in railroad securities, we should enjoy during the next two years the greatest era of prosperity we have ever witnessed."

New Tennessee Phosphate Plant

ACCORDING to Tennessee papers, the Ridley Phosphate Co. is erecting a plant for washing and drying phosphate rock at Ashwood, which is a station near Columbia and Mt. Pleasant, Tenn., both of which places are well known centers of phosphate rock production. The plant will use electric power.

The same papers state that the company has 500 acres of land under development.

Indiana Sand and Gravel Men Hold Special Meeting

THE Indiana Sand and Gravel Association held a special meeting, open to its entire membership, on Tuesday, February 19, at the Hotel Lincoln, Indianapolis, Ind.

No program had been arranged as the meeting was called for the purpose of discussing conditions in general with regard to the industry and also to afford a general "get-together" for members.

The most important subject discussed was that of freight rates. A resolution was passed that the association go on record as believing Indiana freight rates to be too high and that steps be taken to put them back on the same basis they were before the 40% increase was made three years ago.

The report of Treasurer Jesse A. Shearer showed the association to be on an exceptionally good financial footing and to be getting along splendidly, considering the fact that the vacancy caused by the resignation of R. C. Yeoman, executive engineer and secretary, has not yet been filled.

Through the courtesy of Frank J. Billeter, secretary of the Indiana Gravel Co., Indianapolis, and George V. Miller, general manager of the Granite Sand and Gravel Co., also of Indianapolis, the attending members were the guests of the Gyro Club at their weekly luncheon and heard an interesting address by Earl Crawford of the Indiana State Highway Commission.

Those who attended were:

E. S. Baker, Baker Gravel Co., Noblesville, Ind.; Frank J. Billeter, Indiana Gravel Co., Indianapolis; A. M. Brown, Brown-Hoffstetter Sand Co., Indianapolis; J. P. Cantlon, Neal Gravel Co., Mattoon, Ill.; W. P. Carmichael, Carmichael Gravel Co., Danville, Ill.; J. Coppock, Greenville Gravel Co., Greenville, Ind.; Abe Hart, Abe Hart Co., Sandborn, Ind.; E. L. Hackathorn, Greenville Gravel Co., Greenville, Ind.; H. D. Holl, Greenville Gravel Co., Greenville, Ind.; P. D. Holl, Greenville Gravel Co., Greenville, Ind.; C. E. Jefferson, Granite Sand and Gravel Co., Indianapolis; H. L. McGurk, Montezuma Gravel Co., Terre Haute, Ind.; George V. Miller, Granite Sand and Gravel Co., Indianapolis; W. K. Miller, Granite Sand and Gravel Co., Indianapolis; M. A. Neville, Western Indiana Gravel Co., Lafayette; Jesse A. Shearer, Indiana Gravel Co., Indianapolis; R. D. Snyder, Abe Hart Co., Sandborn, Ind.; P. A. Stewart, Kickapoo Sand and Gravel Co., Peru, Ind.; E. Guy Sutton, Carmichael Gravel Co., Danville, Ill.; L. R. Witty, Wabash Sand and Gravel Co., Terre Haute, Ind.

New Alabama Sand Plant to Be One of the Largest in the South

THE *Dixie Manufacturer*, published in Birmingham, Ala., has the following description of the newest plant of the famous sand and gravel producing district near Montgomery:

The big gravel and sand plant now being installed by the Montgomery Gravel Co. at Arrowhead, Ala., 13 miles east of Montgomery on the Western of Alabama railway, will be completed by February 15. It is said to be the largest plant washing and sizing gravel and sand in the Southeastern States as it has a daily capacity of 4000 tons. Its modern equipment includes, in addition to the Link-Belt Co.'s big washing and sizing plant, which is to be electrically operated throughout, two Marion electric shovels on caterpillars and two electric storage battery locomotives, and a locomotive crane for storage service. Five miles of standard gauge track will be required to serve this big plant, which, when in full operation will be shipping from 80 to 100 cars daily of gravel and sand.

This new plant is located on the quarry site of the Shawnee Indian tribe near the town of Sawanogi, at which point the natives manufactured their arrowheads, spearheads and other implements used in middle Alabama, 200 years ago, and since starting the construction of this plant, a great number of arrowheads have been found all over the property. The gravel found on this property, which is of unusually high quality, as discovered by the Indians over 200 years ago, will be marketed under the trade name of "Arrowhead Gravel" and the name of the new station on the Western of Alabama railway will be known in railroad circles from now on as Arrowhead, Ala.

As was announced last November, this company has a contract to furnish the Alabama Power Co. with its entire requirement of gravel and sand for the construction of the big hydro-electric power plant on the Tallapoosa river at Cherokee Bluffs, Tallapoosa county, Ala.

The company, which expects to develop a large commercial business in Alabama, Georgia and Florida, has opened offices at 204-5-6 Shepherd building, Montgomery, Ala. C. E. Ireland, general manager, who will make his future home in Montgomery, was until recently assistant general manager of the Birmingham Slag Co. in direct charge of their big crushing and screening plant at Alabama City, Ala., and resided in Gadsden.

Officers and Directors of Greenville Gravel Co.

AT the annual meeting of stockholders of the Greenville Gravel Co. and subsidiary companies held in Greenville, Ohio, recently the following board of directors was elected: F. D. Coppock, C. E. Patty, Guy C. Baker, H. R. Brown, Joe F. Coppock, D. L. Gaskill, W. S. Meeker and Adelbert Martz.

For the Allied Belting Co. the following board of directors was elected: F. D. Coppock, C. E. Patty, Guy C. Baker, H. R. Brown, Joe F. Coppock, D. L. Gaskill and J. L. Boyle.

The Greenville Gravel Co. is among the largest producers in the country and is also a designer of plants and manufacturer of gravel plant machinery.

The twentieth annual banquet of the Sand Lime Brick Association at Hotel Statler, Buffalo, N. Y., in connection with the annual convention described in the last issue of this paper

Effect of Tennessee Ball Clay Upon Tensile Strength of Gypsum*

By J. M. Porter

MANUFACTURERS of gypsum plasters in the Rocky Mountain region calcine gypsite—a material containing a certain amount of clay. Manufacturers in other localities add to the calcined gypsum a small quantity of clay, shale or other substances which are more plastic than calcined gypsum. These materials are added to improve the working qualities of the plaster.

Opponents to this practice claim that the clay, in some cases, causes a softening or crumbling, in time, of the plaster. This effect is termed "going-back" by the trade. "Going-back" is attributed to the tendency of the clay to take up water hygroscopically, the assumption being that this water which is absorbed from the air dissolves the surface of the gypsum crystals, resulting in a breaking down of the bond.

This investigation was undertaken to ascertain the facts in the case, using tensile strength as the criterion for conclusions.

Briquettes of the form usually employed in cement testing were cast of calcined gypsum and Tennessee ball clay. Averages were calculated from sets of three briquettes. Three series of briquettes were made and tested, one consisting of unretarded calcined gypsum and percentages of clay from zero to 25. A second series of retarded, calcined gypsum and the same amounts of clay as the first and a third series being a one to three sanded, retarded plaster in which quantities of clay were substituted for the calcined gypsum. The two unsanded series were tested at the age of 1 day, 7 days, 28 days, 90 days and 1 year. The sanded series was tested at the age of 1 day, 7 days and 8 months. Before the briquettes were cast the batches of material were brought to the same consistency, namely, a ½ in. slump in a 2x4-in. cylinder. After casting, the briquetes were allowed to remain in the mould for 24 hr., after which they were removed and stored in the laboratory until tested.

From each batch of material panels 6x6 in. were also made. These were made in order to observe the physical characteristics of "going-back" if it occurred. Application was upon expanded metal lath and the coat of ¾ in. in thickness. Storage was the same as for the briquettes.

The results are shown graphically in Figs. 1, 2 and 3.

The panels of neat material at an age of 15 months and the sanded at 11 months, do not show any evidence of "going-back."

In view of the small amount of data it would be dangerous to draw any definite conclusions, but the following indications seem to be justified:

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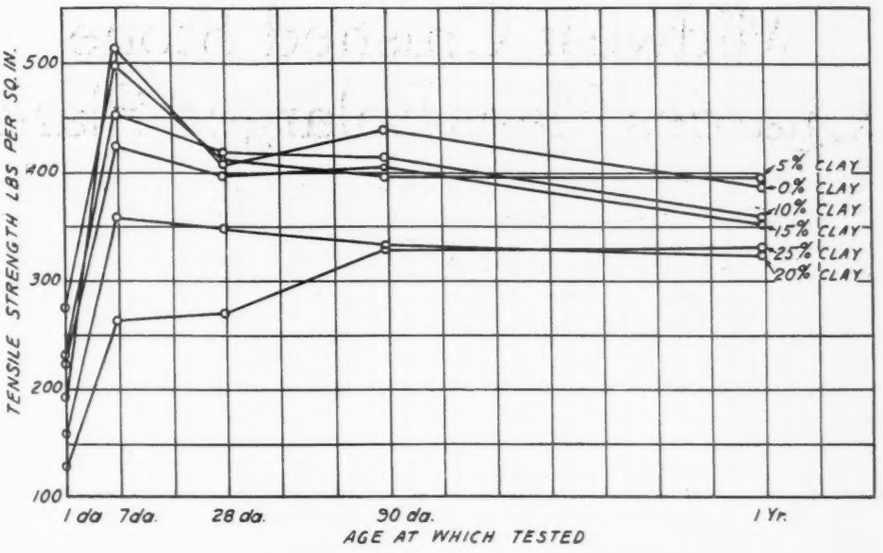


Fig. 1—Strength of neat gypsum unretarded

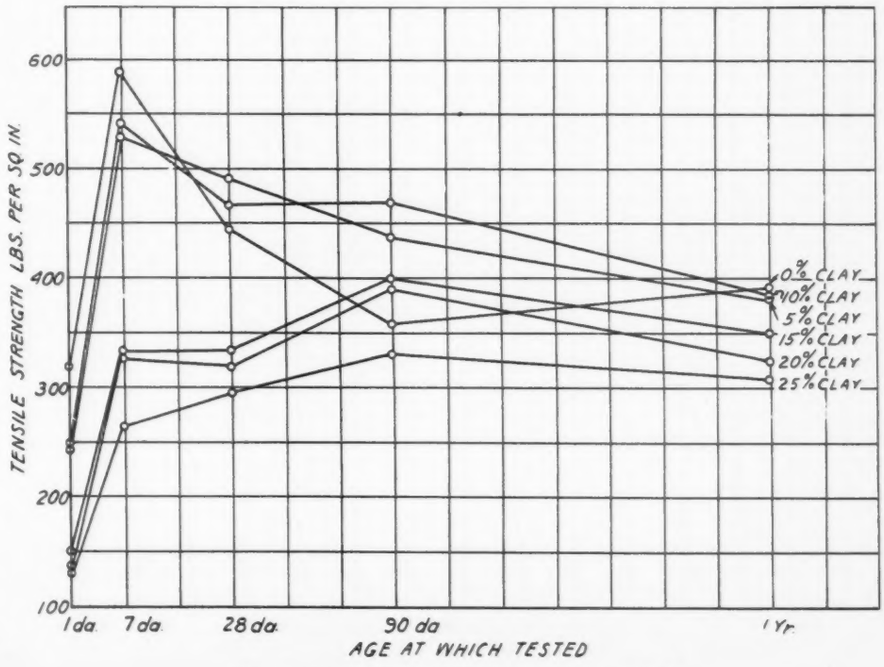


Fig. 2—Strength of neat gypsum retarded

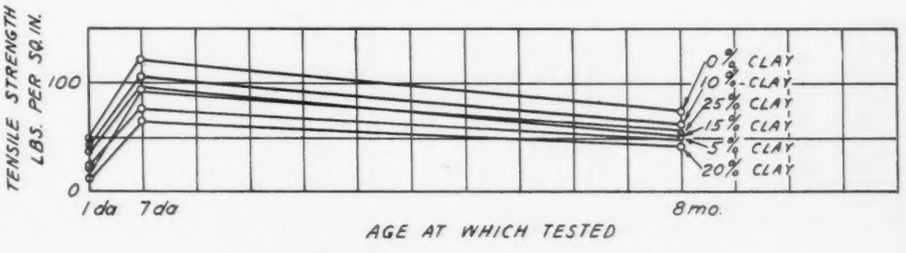


Fig. 3—Strength of sanded gypsum retarded

Large amount of Tennessee ball clay (20% and 25%) cause hardening to occur more slowly.

Plasters containing small quantities of this clay (5%, 10%, 15%) harden rapidly but upon aging become slightly weaker.

Instead of this clay causing gypsum plaster to "go-back," it has the opposite effect. Specimens containing the clay do not show the variations, with age, as those which contain no clay *do*.

Plasters of gypsum, whether neat or sanded, retarded or unretarded, upon aging, are not weakened appreciably by additions of Tennessee ball clay in quantities less than 25%.

Midwest Crushed Stone Quarries Plans Enlarged Plant

THE Mid-West Crushed Stone Quarries, Greencastle, Ind., have been making considerable progress with their reconstruction plans. The new machinery has been ordered and deliveries will begin about March 1. The debris has been cleared away and the damaged machinery is being overhauled with a view to using what can be repaired. Concrete foundations for bins will be started at once.

The new bins and crusher buildings will be of steel. There will be eight bins in a double row of four with a loading track under each row. These bins will be 16x12 ft. and 16 ft. high. These bins and screen rooms will make a building 95 ft. high.

The plant will be considerable larger than before, with a capacity of 50 cars of stone in 10 hr. A new switch, 1400 ft. long, will be built south of the present tracks. Storage tracks have been finished and a storage of 100,000 tons of crushed stone has been provided for.

The initial crusher will have an opening 30x90 in. The stone passes through the crusher and will be elevated to a revolving screen 5x12 ft. by a 42-in. bucket elevator. This screen is a scalping screen and takes out a 2½-in. and finer stone which drops into a 38-in. bucket elevator with 88-ft. centers. The oversize of the scalping screen goes to a No. 8 gyratory crusher set to 2½ in. The stone through the No. 8 also drops into the 38-in. elevator and is elevated to a large sizing screen 6x24-ft. A 10-ft. dust jacket with ½-in. openings extends around the end of the screen. This screen produces a ½-in. and finer stone and 1 in., 2 in. and 2½ in. screened sizes. The ½-in. and finer size drops into two revolving hexagon screens which screen out a ¼-in. and finer product and clean ½ stone goes to a bin. The ¼-in. and finer falls into a revolving hexagon screen 5x15 ft., which screens out the ⅛-in. agricultural limestone and the ¼-in. discharges into a bin. The 1 in., 2 in. and 2½ in. sizes pass over suspended knocker screens before dropping into bins so that all dust carrying over can be eliminated as well as undersized chips. This dust and small chips taken out pass through the battery of hexagon screens and are screened and delivered to the proper bins.

The oversize stone from the 6x24-ft. screen drops to a belt conveyor and over a magnetic pulley to catch any tramp iron and prevent it getting into reduction crushers. Then the stone drops into a chute and goes by gravity to a 36-in. Symons disc crusher and a No. 6 gyratory for further reduction. The crushed stone passes through these crushers into a 26-in. elevator with 84-ft. centers and is elevated to a secondary sizing revolving screen 4x12 ft. Here the ½-in. and finer is screened out and drops into a 4x10-ft. hexagon revolving screen which separates it into agricultural limestone and clean ½ stone. The 1¼-in. stone is screened out and passes over a knocker screen into a bin. The undersize from this knocker screen is delivered into the same hexagon screen as the ½-in. crusher run and is screened and sized. The oversize stone from the 4x12 ft.

E. B. Taylor, Superintendent, Mid-West Crushed Stone Quarries

screen drops into a chute which delivers it to a 24-in. Symons disc crusher and final recrushing and is again elevated by 26-in. elevator to 4x12 ft. screen for final screening.

The main line shaft, 6 in. in diameter, will be driven by a 500 hp. motor. Current will be furnished by the Wabash Valley Electric Co. From this shaft will be driven the crushers, 42-in. elevator, scalping screen, two 4-yd. hoists and dust collecting fan.

The 38-in. and 26-in. elevators and all screens in top of the building will be driven from a line shaft which will be driven by a 150 hp. motor. A Link-Belt Co. silent chain drive which runs in oil will connect motor with the line shaft. This is installed because of dusty conditions. All screens will drive with heavy sprocket chains. All gears and sprockets will be of cast steel. The primary screen has a solid steel frame. In the plant will be 10 screens. Every size will be rescreened, thus insuring the best preparation. A dust collector to collect dust from around the machines by air suction will be installed.

The steel will be fabricated and erected by Hetherington & Berner Co. of Indianapolis. Shipments of steel will begin at once and building will be in place in six weeks.

Three new sizes of material will be put on the market, a 12-mesh sand, a 30-mesh dust and a ⅛-in. chicken grit. These will be made at the east mill.

There will be throughout corrugated zinc roofing and siding furnished by the American Zinc Products Co. of Greencastle.

The construction will be complete in every detail and the last word in crushed stone sizing and screening. The plant will be one of the most modern plants in the country and will carry screens of unique type developed through years of experience.

The large crusher, screens and elevators will be furnished by Worthington Pump and Machinery Co. of Cudahy, Wis.

It is thought the plant will be operating before May 1. E. B. Taylor is superintendent of the plant.

Security Lime and Cement Co. Pays Big Stock Dividend

THE Security Lime and Cement Co., of Hagerstown, Md., has recently increased its common capitalization from $800,000 to $1,200,000, and disbursed the additional stock among its shareholders in the shape of a 50% stock dividend. The company has also paid 18% in cash dividends during the year. The company's capitalization consists of $504,000 first mortgage 6% bonds, $500,000 second mortgage 5% bonds, $300,000 7% five-year notes and $750,000 cumulative 7% preferred stock.—*Hagerstown Globe.*

Cement Freight Rates Investigation Is Started

THE Interstate Commerce Commission has ordered an investigation of the proposal of various railroads to place all freight rates on cement from the Lehigh district in Pennsylvania, producing points on the same basis, to points in New England on the Maine Central, Bangor & Aroostok and Grand Trunk railroad, and to make rates from the Hudson, N. Y., district 50 cents per ton under those from the Lehigh district.

The proposed changes would result in both increases and reductions in the rates. Pending the investigation, the commission ordered the suspension until May 4 of the operation of the proposed schedules.

Big Crushing Plant for Napa, Calif.

ONE of the largest crushed rock producing plants in the West is being constructed by the Basalt Rock Co., of Napa, Calif., in the rock ledges among the hills adjacent to and just southeast of the Napa State Hospital. The project will cost in the neighborhood of $150,000.

Huntsville, Texas, Quarry to Install Novel Method of Handling

(Special Correspondence)

THE Huntsville Stone and Crusher Co. has been organized to produce crushed stone and other stone commodities about nine miles from Huntsville, Texas. This company is a subsidiary of the D. M. Pickton Co., which is a very well known contracting firm in Texas, as they have built most of the sea-walls and break-water around that part of the Gulf. The deposit is an extensive formation of quartzite, with a silght over-burden, and has a depth of from 20 to 40 ft. There are about 52 acres of it, and very easy to get at so that their operation should be most successful. They are installing a rather unique method of handling from quarry to crusher, and although I have never seen it before, I can see some good features in it.

They are installing a complete crushing plant furnished by the Kennedy-Van Saun Mfg. and Eng. Corp., which is to consist of a No. 5 gearless crusher, a No. 6 elevator, 60-ft. centers, and a 48-in. by 18-ft. Kennedy revolving screen with a 5-ft. dust jacket. The stone is to be manufactured in three sizes besides the dust or screenings, and as this is a very hard rock there will be plenty of market for it in this part of Texas, for Walker county has recently decided to put down metal roads.

The quarry is to be worked in the ordinary manner from the face and the stone will be loaded into skips by hand, but there will be no tracks on the quarry floor. On the top of the stone a track will be laid 48 ft. wide, and a derrick will travel on this track. There will also be a narrow gage track. There will be a small train of side-dump cars on this track handled by a gasoline tractor. The derrick will pick up the skip from the bottom of the quarry and dump it into this train of cars. These cars will then proceed to a point of the quarry face which is not to be blasted out, and there they will discharge into the crusher, which will in turn discharge into the elevator, and this eliminates the necessity of an incline to the crusher or of burying the crusher in a pit below the quarry floor surface.

I might say here that while the Kennedy Van Saun Mfg. and Eng. Corp. will design this plant and supervise the erection, it is the plan of W. F. Paul of the Huntsville company to operate the handling of the stone before it goes to the crusher in the manner in which I have described.

This method is probably against all preconceived ideas of handling stone from quarry to crusher, and it will be very interesting to note what the success of such a manner of handling may be. As a matter of fact if this method is not successful, it can easily be changed to the old method of laying tracks in the quarry, but will necessitate an incline to the crusher.

Provision is being made in the drawings of the plant for an additional crusher to be installed and that will be a No. 25 Kennedy gearless reduction crusher, which will enable the plant to turn all the material when necessary into ¾-in. and finer.

Mr. Picton's idea is to increase the capacity of this plant, not by the addition of a larger unit, but by the addition of one or more units the same as described above, and this is a good idea because the quarry face will never be large enough for a large steam shovel operation and a large unit crusher.

This plant will be erected within the next 60 days and ready for operation.

W. J. C.

Officers Elected by the Indiana Crushed Stone Association

THE January issue of the Commissioner, the official publication of the County Commissioners' Association of Indiana and three other kindred state organizations, announces the election of officers for 1924 for the Indiana Crushed Stone Association. Officers chosen were: President, C. E. Greely, St. Paul, Ind.; vice-president, J. E. Baney, Kentland, and secretary-treasurer, Fred W. Connell, Indianapolis. Members of the executive committee are: E. B. Taylor, Greencastle; H. E. Blair, Toledo, Ohio; Greely and Baney.

H. D. Conkey Company to Build Another Illinois Gravel Plant

ACCORDING to the Somonauk, Ill., *Reveille*, the H. D. Conkey Co. has purchased 70 acres of gravel land near North Aurora from the J. M. Feltes estate and J. L. Dickes and plan to construct a plant with an output of 50 and 60 cars a day, it was announced recently by W. G. Van Etten, vice-president of the company, and W. H. Ehrler, superintendent. The consideration was $500 an acre.

The company is now operating properties near Yorkville, Sheridan, Moronto and Oregon, but claim that the one at North Aurora will be the largest. The other properties now have an output of about 90 cars a day.

A side track is being built to the gravel beds by the Burlington railroad and it is expected to have the pit in operation by July 1. Steam shovels and other equipment for washing and grading the gravel will be installed. A force of about 30 men will be used in the pit.

The gravel bed has an average depth of 35 ft. The beds will furnish three grades of gravel and two of sand.

Deal Pending for Redington, Pa., Quarries

ACCORDING to local papers, the large limestone quarries located at Redington, Pa., along the Lehigh Valley railroad, operated for many years by the Redington Quarry Co., will likely pass into the hands of a syndicate of Bethlehem business men. A deal is pending for the sale of the property, which if completed will mean a resumption of operations at the quarries this spring.

The Redington company, for a long time quarried fluxing stone for the Bethlehem Steel Co. Analysis and tests of the product from the quarry are now being made and if they are up to the standard set by prospective buyers of the property the purchase will be made.

Petition Circulated to Sell Mississippi State Lime Plant

A NEWS dispatch from Waynesboro, Miss., to Southern newspapers, says that it has just been learned that a petition is being circulated in some parts of Wayne county asking the Mississippi legislature to sell the lime crushing plant at Limestone, four miles north of Waynesboro. This is a branch of the state penetentiary, and is worked entirely by convict labor. The crushed lime is sold to all citizens of Mississippi for $1 per ton. It never has been able to supply the demand, because it has not been properly equipped until recently; the state is now putting in new and up-to-date machinery, and will soon be ready to furnish lime to all south Mississippi.

Wayne county people are being aroused by this move which they believe is for a selfish purpose. The analysis of the lime shows from 94 to 99¼% lime, and is the highest percentage in the state.

Big New Oklahoma Gravel Plant

ACCORDING to an Oklahoma newspaper, with the completion of the Southwestern Light and Power Co.'s 66,000-volt high line to Cache, Okla., the Industrial Sand and Gravel Co., which promises to be one of Comanche county's largest industries started operation.

Complete machinery for the excavating of gravel from pits on West Cache creek and a washing plant has been installed which will enable the company to load approximately 100 cars of gravel daily.

1923 Amazingly Prosperous for U. S. Gypsum Company

By O. A. Mather

AS A RESULT of the country-wide building boom, the United States Gypsum Co. enjoyed marked prosperity last year. In fact, the company's annual statement of earnings is one of the most remarkable corporation reports yet to appear.

Net earnings for 1923 were $6,848,942, a gain of more than 50% over 1922. Net income, after deductions for depreciation, taxes, and an item of $500,000 for contingencies, was $5,030,922, and after payment of preferred dividends there was a balance of $4,609,744 available for the common stock. The average common stock outstanding during the year was approximately $4,904,000, so that earnings were equivalent to about 94%, or $19 a share, on the $20 par value common stock.

$3,429,254 Added to Surplus

The common stock outstanding at the end of 1922 was $4,431,040. A 10% stock dividend was paid in January last year and a 20% stock dividend was paid late in December. The issue at the end of 1923 was $5,911,680. Even on the increased common stock issue net earnings for last year were equivalent to $15.60 a share. Surplus at the end of 1923 was $9,045,049, an increase of $3,429,254 over 1922.

Furthermore, expenditures on plant, etc., totaled $2,088,507. Current assets total $9,881,361, an increase of $3,982,870, while current liabilities are $1,958,842, an increase of $89,642.

President Sewell L. Avery said the agreement for consolidation of J. B. King & Co. calls for giving $3,000,000 of preferred and $500,000 of common stock at $20 par value for the $500,000 par value stock of the King company.—*Chicago Tribune.*

New Utah Gypsum Co. Secures Big Contract

THE Mammoth Plaster Co. of Cedar City, Utah, has just been awarded the contract to supply 400 tons of raw gypsum daily to the Blue Diamond Material Co. of Los Angeles at a price which practically insures dividends from the outset.

Bids are now being called for by the Mammoth Plaster Co. for the quarrying, crushing, and hauling to the railroad of the gypsum. According to officers of the company, the allotment of stock to be sold for the erection of the first unit of the plaster mill has been practically disposed of and the breaking of the ground for the erection of the mill will begin as soon as frost is out of the ground.

By July of this year the company expects to have the mill completed and in operation. In the meantime the shipping of the raw product will go on, the contract calling for 200 tons daily for the first month and 400 tons daily for five months thereafter, with the probability of a continuous shipping of 400 tons for an indefinite time.

Nevada Silica Deposits Being Operated

LARGE deposits of high-grade silica near Cuprite, 13 miles south of Goldfield, Nev., have been purchased by the American Silica Co. of Los Angeles, and carload shipments of the product are already going to the company's factory at Burbank, Calif. Two separate deposits of large extent, both near the railroad, and one formerly owned by the Super Silica Corp., have been taken over by the Los Angeles company, which handles more silica than any other concern in the West.

I. R. Landis, financial agent of the company, has been in Reno and at Carson City in connection with the purchase of the properties. The men with whom he is associated control three separate corporation that consume large quantities of non-metallic minerals, the American Silica Co., the American Refining Co. and the Empire China Co. The two first mentioned have plants in Los Angeles and the Empire China Co. has a large factory at Burbank, a suburb of the Southern metropolis. This factory is the largest producer of chinaware and pottery in the West.

New Texas Lime Company to Make Calcium Arsenate

ACCORDING to Texas newspapers, the charter of the Texas Calcium Arsenate and Lime Co., having a capital stock of $600,000, and with offices in Dallas, Texas, has been filed with the secretary of state. Officers of the company are as follows: President, S. C. Williams, Bryan; vice-president, J. L. Spurlin, Sr., Waco; and secretary-treasurer, W. H. Hanover, McGregor.

The company has been formed to take over the holdings of the Waco Lime Products Co., 25 miles west of Waco, on the Cotton Belt, where a plant has been installed which will produce 100 tons of lime and 40 tons of calcium arsenate daily. The latter product has been used extensively in curbing the boll weevil menace. The properties of the company include a mountain of lime, near McGregor, which has assayed 99% pure.

Besides the officers those interested in the venture are as follows: Paul Garrett, C. P. Shaffer, McGregor; J. P. Philp, Beaumont; P. O. Wilie, Dallas; W. M. Montgomery, Shreveport; L. W. Hagg, New York, and R. H. Threet, South Bosque, Texas.

Open-Hearth Refractory Materials

IN connection with the study of open-hearth refractory materials, being undertaken by the Department of the Interior at the Ceramic Experiment Station of the Bureau of Mines, Columbus, Ohio, experimental work has been started which has as its aim the production of a high alumina refractory using a kaolinitic bauxite as the raw material. There are large deposits of bauxite high in silica, that have found a very limited field of usefulness, which it is hoped can be utilized to produce a less acid refractory than silica and which will at the same time have a higher fusion temperature. When such material is fused or highly sintered, it can be made into a brick which will be practically free from the high shrinkage characteristic of bauxite brick burned at the ordinary kiln temperatures. The mineralogical composition aimed at is a mixture of sillimanite and corundum together with the eutectic formed between these two minerals.

It is proposed to prepare the sinter by the method proposed by Lecesne or whatever modification of same may seem desirable. One modification which has been suggested is the utilization of oxygen-enriched air for the blow toward the end of the burn.

A study of the possibility of increasing the proportion of tridymite in a silica brick by the utilization of a suitable flux to aid in the normally sluggish transition from quartz to tridymite has been started. To just what extent this transition is possible by holding commercial bricks within the tridymite range for varying lengths of time up to two weeks is under investigation.

Buys into Alabama Asphalt Concern

ALABAMA newspapers report that Dr. Miller Reese Hutchinson has purchased an interest in the Cherokee Rock Asphalt Co. The interest of Dr. Hutchinson, associate of Thomas Edison, inventor himself and native Alabamian, in this project, assures its success, Cherokee residents believe.

Development of the rock asphalt industry in Colbert county, Alabama, has been rapid in the last 12 months, and with Dr. Hutchinson behind the Cherokee company rapid progress is expected.

German Cement

THE maximum cement prices in Germany were abolished by decree of November 23, and recently the government gave up general control and lifted the export embargo. Few domestic sales of cement are made, due to the lack of new building projects. It is felt, therefore, that new foreign markets must be created, particularly in South America.

Editorial Comment

Peat and Rock Products

Coal has been so abundant in this country that few attempts have been made to utilize peat. The last issue of ROCK PRODUCTS described the German utilization of brown coal in the lime industry (brown coal being similar to peat) and spoke of the possibilities of using peat in the same way in the United States. The great objections to peat are its bulk and its water content. Numerous inventors have tried to compress and dry it cheaply, but until now there has been no process that promised to be a commercial success. It is now reported that E. A. Plummer, of Minneapolis, is erecting a plant near Carlton, Minn., in which a simple tower dryer will be used. The peat will be blown to the top of the tower and will then fall against a rising current of hot air. The moisture content will thus be reduced to 20% or less and in this shape it can be briqueted without the addition of a binder. The United States Geological Survey has appropriated $100,000 for investigating peat and lignite, so these substances are fairly sure to be put on a commercial basis before long. Experiments will be made principally with the use of peat and lignite in gas producers. There is no shortage of coal to be mined, but so long as the coal industry continues in its present disorganized state, the search for substitutes will be keenly prosecuted.

New Plastering Machine

The $16 to $20 a day plasterer apparently is doomed to the same fate that has come to other workmen who have attempted to keep the control of an industry in the hands of a small group of skilled craftsmen. This particular form of monoply is one that our modern industrial civilization does not tolerate, and when it arises the inevitable result is to "take the skill out of the man and put it into a machine," to use Henry Ford's phrase. It is one of Henry's engineers who is experimenting with a plastering machine which, it is reported, did a wall 222 ft. long and 9 ft. high in 3 hr., applying a ⅜-in. scratch coat. The same report says that it would have taken eight skilled plasterers to have done the same thing in the same time. The success of such a machine means considerable to the rock products industries. If it comes, we shall probably see a decreased use of the various wall boards and other plaster substitutes and an increase of both lime and gypsum plastering. A student of small house building methods suggests that the machine, or a variation, may even be used to build bearing walls for small structures, working on the lines suggested by Architect Flagg for partitions. The possibilities are great, and the incentive which comes from the high wages paid to plasterers is enough to insure the machine's rapid development.

An Interesting Experiment

It is possible that Rapid City, S. D. may be the scene of an interesting experiment. The state of South Dakota is building a portland cement plant there and the Globe Cement Co. proposes to do so. Both will draw their raw materials and fuel from practically the same sources, and both will operate with the same kind of labor. There is no question but what the privately-owned plant can produce cheaper (and probably better) cement than the state-owned plant. The interest will lie in the attitude of the voters, whether as taxpayers they will want to use the cheaper cement, or as firm advocates in the state ownership and operation of such plants they will be willing to go on losing money for the sake of a principle. This is assuming, of course, that the costs of making cement in a state-owned plant will be honestly figured and published.

Cement Developments

In spite of the fact that portland cement manufacture has reached such a high plane of development, research and investigation are going on in the cement field with increased vigor. In America we have given our thought to the matter of production, improving methods and machines to a point where we can keep up with a market that grows at a surprising rate. In Europe a good deal of the research has been along the lines of making other cements than portland, and the result of this research has been shown in the development of the *ciment fondu* industry and now in the rapid setting slag cement which is described in this issue of ROCK PRODUCTS. Details of the process of manufacture are not given in the report. So far as the chemical analysis goes, this new cement is practically the same as some of the ordinary European slag cements as given by Eckel (see page 611 of Cements, Limes and Plasters). The only noticeable differences are that the new cement has 1.2% of silicious sand added and that it is a little lower in lime. For the rest, the article comes from a very reputable French magazine and one which is noted for the number of excellent and authoritative articles it has published on the chemistry and constitution of cements. It is apparent that the efforts of Continental chemists are being directed along the line of finding a more rapid setting cement, as both the cements mentioned above have that property. Time saving is especially important in city paving construction and highway work.

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert,
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning February 18:

Central Freight Association

7902. Gravel and sand, other than blast, engine, foundry, glass, molding and silica. From Richmond, Ind., to Sellersburg, Ind. Present, 17 cents; proposed, $1.05 per net ton.

7904. Sand (except loam sand) and gravel. West Ellwood Jct., Beaver, Woodlawn, and So. Heights, Pa., to Brookfield, Tyrrell and Fowler, Ohio. Present, $1.15 per net ton; proposed, $1 per net ton.

7909. Crushed stone and crushed stone screenings. Holland, Ohio, to Fostoria, Ohio. Present, 90 cents per net ton; proposed, 80 cents per net ton.

7913. Ground limestone (ground from lime rock). Joliet, Ill., to C.F.A. territory. Present, 80% of 6th class; proposed, 65% of 6th class. C.F.A. L. Trf. 228, I.C.C. U.S. 1, will not apply.

7916. Sand and gravel. Wolcottville, Ind., to Pierceton and Winona Lake, Ind. Present, 88 cents and 95 cents per net ton; proposed, 80 cents per net ton.

7933. Slag. Chicago and points taking same rates to Indiana. (Rates per ton of 2000 lb.):

To	Present	Proposed
Crown Point, Ind.	$1.01	$0.92
Winfield, Ind.	1.01	.92
Palmer, Ind.	1.01	.92
Hurlburt, Ind.	1.01	.92
Boone Grove, Ind.	1.01	.92
Kouts, Ind.	1.01	.95
Clanricarde, Ind.	1.01	.95
Wilders, Ind.	1.01	1.00
Lomax, Ind.	1.01	1.00
North Judson, Ind.	1.01	1.00
Bass Lake Jct., Ind.	1.26	1.15

7978. Gravel and sand (other than blast, engine, foundry, molding or silica). Milford Junction and Leeland, Ind., to Indiana:

	Per net ton	
To	Present	Proposed
Cromwell	$0.81	$0.63
Kimmell	.81	.63
Albion	.81	.81
Avilla	.92	.88
Garrett	.92	.88
Auburn Jct.	1.04	.88
Concord	1.04	.97
St. Joe	1.04	.97
Hicksville	1.04	.97

7982. Cement, common, hydraulic, natural or portland. Cement City, Mich., to Cincinnati, Ohio. Present, 13½ cents; proposed, 11 cents.

Note: To apply only on traffic destined to points south of the Ohio river except Altamont, Andrews, Bellevue, Brent, Central Covington, Covington, Dayton, Henderson and points taking same rates, Latonia, Louisville, Ky., Ludlow, Owensboro and points taking same rates, Newport, Paducah, Water Works and Wilders, Ky.

7984. Sand and gravel. Summit Grove, Ind., to Piper City, La Hogue and Gilman, Ill. Present, combination of locals; proposed, $1.01 per net ton.

7992. Crushed stone. Buffalo, N. Y., to Pennsylvania. Present, to Franklin, Oil City and Pecan, $1.76 per net ton, and to Van and Elmo, $1.89 per net ton; proposed, $1.60 per net ton to Franklin and Oil City, Pa., and $1.75 per net ton to Pecan, Van, Elmo, Electra and Sutton, Pa.

Illinois Freight Association

916-B. Cement, common, hydraulic, portland or natural. Carloads, minimum weight 50,000 lb. marked capacity of car to govern if less, from Gulf Junction, Mo. (billing station Cape Girardeau, Mo.), to all points in I. R. C. territory, e. g., 10.5 cents to Harrisburg, Ill.; 8.5 cents to Murphysboro and Marion, Ill.; 12.5 cents to Lawrenceville and Effingham, Ill.; 15 cents to Bloomington, Hoopeston and Watseka, Ill., etc.

1495-E. Cement. Carloads, proposals (a) to establish rates from producing points in I. R. C. territory to Paducah, Ky., based on arbitrary of 2 cents per 100 lb., River Transfer over North Bank points; and (b) to revise rates from La Salle and Dixon, Ill., to points in Illinois, published in W. T. L. 132-C, based upon statement of corrected mileages submitted by Lehigh Portland Cement Co. from La Salle, Ill., and the Sandusky Cement Co. from Dixon, Ill.

1566-C. Sand and gravel. Carloads, minimum weight 90% of marked capacity of car from Chillicothe, Ill., to C. & N. W. Ry. stations, e. g., 95 cents to Kickapoo. Limestone, South Pekin and Green Valley, $1.05 to Allen, Luther, Sweetwater, etc.; $1.25 to Bando, Archer, Lick, etc.; $1.35 to Virden, Girard, Benid, etc.

2220. Cement. Carloads, minimum weight 50,000 lb., subject to marked capacity of car, if less, 15 cents per 100 lb., from Buffington, Ind., and South Chicago, Ill., to Nason, Ill.

2346. Lime rock. Carloads, minimum weight marked capacity of car, but not less than 80,000 lb., $1.25 per net ton from Mosher and Ste. Genevieve, Mo., to Alton, Ill.

2351. Sand. Carloads, minimum weight 90% of marked capacity of car, $2.02 per net ton from Ottawa, Ill., to Benton Harbor, Mich.

2355. Molding sand. Carloads, minimum weight marked capacity of car, $1.60 per net ton from Wilmington, Ill., to Milwaukee, South Milwaukee, Racine and Kenosha, Wis., and directly intermediate points.

2357. Stone, sand and gravel. To establish commodity rate of $1.26 per net ton on crushed stone, carloads, and sand and gravel, carloads, from Joliet, Ill., and $1.13 per net ton on sand and gravel, carloads, minimum weight marked capacity of car, from Lincoln and Pekin, Ill., to Flora, Clay City, Xenia and Iuka, Ill. Note: Rates will not include switching at Pekin.

2360. Crushed stone. Carloads, minimum weight 90% of marked capacity of car; $1.13 per net ton from Gladstone, Jaynes, Spur, Biggsville and Moline, Ill., Bettendorf and LeClaire, Iowa, and Rockford, Ill., to Princeton, Ill.

Southern Freight Association

12573. Slag. Carloads, from Birmingham and Boyles, Ala., to L. & N. R. R. Pensacola and Pensacola & Atlantic division stations. The present rates from Boyles are Class A, while from Birmingham the rates to Pensacola division are Class A and to P. & A. division stations are commodity rates. Proposed rates: To Pensacola division—To stations Tarzan to Valdin, inc., $1.70; to stations Pine Barren to Roberts, inc., $1.80; to Olive and Brent, Fla., $1.90 per net ton. To P. & A. division stations—To stations Bohemia to Galliver, Fla., $1.90; to stations Milligan to Ponce de Leon, Fla., inc., $2.10; to stations Westville to Marianna, Fla., inc., $2.20, and to stations Crigler to River Junction, Fla., inc., $2.30 per net ton. It is stated the proposed rates are in line with rates from and to other points on the L. & N. R. R. Where Class A rates are now effective, the proposed revision represents reductions, while commodity rates are both increased and reduced.

12593. Slag. Carloads, from Birmingham, Ala., and group to Central of Georgia Ry. Perry Branch stations. It is proposed to establish rate of $1.53 per net ton, same as current rate to Fort Valley, Ga., and the same as proposed to the Public Service Commissions of Alabama and Georgia under Commodity Group 9.

12595. Cement. Carloads, from Chattanooga, Tenn., to Southern Railway, Applachia Division stations. Sixth class rates now apply. It is proposed to revise present rates to be in line with rates recently established to Southern Railway, Knoxville Division, stations. Statement showing present and proposed rates will be furnished upon request.

12599. Stone, crushed or broken and marble spalls (suitable for fluxing purposes). Carloads, minimum weight marked capacity of car, from Knoxville and River Front Extension, Tenn., to Rockwood, Tenn. Present rates: From Knoxville on marble spalls, $1.25; on crushed or broken stone, $1.17 per ton 2000 lb., from River Front Extension, on marble spalls, $1.36½; on crushed or broken stone, $1.28½ per ton 2000 lb. Proposed rates, from Knoxville, 80 cents; from River Front Extension, 90 cents per ton 2000 lb. Proposed rates are in line with rates to and from other Southeastern points, distances considered.

12695. Sand and gravel. Carloads, from Arundel Siding, Old Dominion Siding and Ellerslie, Va., to Sebrell, Va. Present rate, $1.23 per net ton. (Jarratt, Va., combination, in connection with Agent Jones' Combination Rules Tariff.) Proposed rate, $1.21 per net ton, made by using rate of 88 cents per net ton, made by Virginia, plus local rate beyond, processed under Agent Jones' Combination Tariff. The 88 cent factor is made the same as present rate to Emporia, Va., a more distant point.

12696. Gravel. Carloads, minimum weight marked capacity of car, except when car is loaded to full visible capacity, actual weight will govern, from Sulligent, Ala., to Aberdeen, Miss., and intermediate St. L. S. F. Ry. stations. Present rates: Mileage commodity rates of from 4½ to 7½ cents per 100 lb., equivalent to per net ton rates of from 90 cents to $1.50; proposed rate, 55 cents per net ton, same as present rate from Columbus, Miss., to Aberdeen, Miss.

12697. It is proposed to reduce the present rates on sand and gravel, carloads, from Montgomery, Ala., to Anniston and Talladega, Ala., to be the same as at present in effect from Jackson's Lake, Ala.

12716. Cement. Carloads, minimum weight 40,000 lb., from Leeds, Ala., Dothan, Ala. Present rate, 19½ cents per 100 lb.; proposed $3.38 per net ton, made same as rate recently established from Birmingham to Dothan, Ala.

12721. Lime. Carloads, minimum weight 30,000 lb., from Cumberland, Ala., Sherwood and Summitville, Tenn., to Carolina Common and junction points and Seaboard Air Line Railway stations. It is proposed to revise present rates in line with rates now in effect from Ladds and Portland, Ga. Present and proposed rates to representative points are as follows, in cents per ton 2000 lb.:

	Sherwood, Tenn.		Cumberland, Ala.		Summitville, Tenn.	
	Pres.	Pro.	Pres.	Pro.	Pres.	Pro.
Abbeville, S. C.	417	380	417	370	428	380
Charlotte, N. C.	473	390	473	390	484	380
Columbia, S. C.	417	400	417	390	428	400
Durham, N. C.	540	410	540	400	552	410
Florence, S. C.	450	410	450	400	462	410
Greenwood, S. C.	417	380	417	380	428	380
Henderson, N. C.	540	410	540	410	552	410
Lincolnton, N. C.	507	400	507	400	518	400
Prosperity, S. C.	428	400	428	390	439	400
Weldon, N. C.	597	410	597	410	608	420

Southwestern Freight Bureau

133. Cement (except asbestos and mortar color). To amend page 252, S.W.L. Trf. 26X, applying on cement (except asbestos and mortar color), carloads, minimum weight 50,000 lb., from Ada, Dewey and Hartshorne, Okla., to Texas points by eliminating Eagle Pass and rates provided therefore, such adjustment being claimed necessary to place rates to Eagle Pass on a proper basis.

187. Sand and gravel, etc. To provide the following minimum weight in connection with shipments of sand and gravel, etc., as described in Item 316, S.W.L. Tariff 53G, between Oklahoma points on intrastate traffic: Minimum weight 90% of marked capacity of car, except where cars are loaded to actual visible loading capacity, actual weight shall govern, but not less than 50,000 lb. It is contended inasmuch as this basis now generally applied throughout the entire United States, there should be no objection in applying same between points in Oklahoma.

Transcontinental Freight Bureau

4537. Lime. Carloads, W. B.; proposed to publish rate of 50 cents per 100 lb., minimum weight 60,000 lb., from Ash Grove, Mo., to Pacific coast points under Tariffs 1W (L.C.C. 23, A116, 1476, 1129, N. W. Hawkes, H. Wilson, B. T. Jones and R. H. Countiss, agents, respectively), and 4T (I.C.C. 24, A114, 1471, 1130, N. W. Hawkes, H. Wilson, B. T. Jones and R. H. Countiss, agents, respectively).

Western Trunk Line

1646A. Lime. Carloads, from Savanna, Ill., to points on the C. M. & St. P. Ry. (Applies on shipments originating east of the Indiana-Illinois state line.) Present, the combinations via Savanna are higher than those in effect via Peoria, Ill.; proposed, to equalize the rates via Savanna to the same basis as now in effect via Peoria. For illustration, to a few representative points the "proposed rates" are as follows: Pickering, Iowa, east, 23½ cents; west, 10 cents; less single advance, 2 cents; through 31½ cents. Huxley, Iowa, east, 23½ cents; west, 11½ cents; less single advance, 2 cents; through, 33 cents. Des

Moines, Iowa, east, 23½ cents; west, 11½ cents; less single advance, 2 cents; through, 33 cents. Ottumwa, Iowa, east, 23½ cents; west, 10 cents; less single advance, 2 cents; through 31½ cents. Kansas City, Mo., east, 23½ cents; west, 14 cents; less single advance, 2 cents; through, 35½ cents. Mason City, Iowa, east, 23½ cents; west, 10 cents; less single advance, 2 cents; through, 31½ cents. Minimum weight, 30,000 lb.

RATES ON LIMESTONE

A proposal to increase rates on limestone in carloads from Krause, Ill., and Columbia Quarry No. 2 to points on the Missouri Pacific at St. Louis was attacked at the hearing in I. and S. 1948, January 31, at Chicago, before Examiner Butler. Increases of from 14 to 40 cents in the present rate of 63 cents are under suspension on protest of the Columbia Quarry Co.

The same situation was before the Commission in I. and S. 1587, in which the carriers proposed to use the full local combinations through the cancellation of the through rate. The Commission, in that case, denied the proposals of the carriers following the development that there was a dispute between the Missouri Pacific and the Mobile and Ohio, the originating carrier, as to divisions.

In defending the proposals, C. C. P. Rausch, assistant freight traffic manager for the Missouri Pacific, said there was no dispute between the carriers as to divisions of the present proposals. He explained the manner in which the proposed rates were constructed and stated that divisions would be made on that basis. In justification of the proposed rates, he said the present rate of 63 cents was not a living rate and that the proposed increases were necessary to make the rates compensatory. He outlined the manner of application of the proposed rates and testified as to the high costs of movements through the St. Louis terminal district. The rates were to be applicable, it was said, only from the origin points named on the Mobile & Ohio to Vulcan, Ill., thence via Missouri Pacific and ferry across the Mississippi to delivery points on the Missouri Pacific.

Mr. Rausch was followed by F. A. Clifford, special assistant to the general manager of the Missouri Pacific, who submitted the results of a study of the costs of handling the traffic affected by the proposed rates. His figures were intended to show that the business could not be handled without loss under the present rates.

R. A. Chadwick, commerce agent for the Mobile and Ohio, followed, saying that the service performed by his road in handling the traffic from its origin to Vulcan, where it is turned over to the Missouri Pacific, consisted of two distinct train services and that no scales or company switching facilities were available at one of the quarries. He made comparisons of the proposed rates with other similar rates on coal and other low-grade commodities to show that the proposals were reasonable. Comparisons were also made with rates for similar movements from other points and to other points from the origin points under consideration.

He said the empty cars for the traffic were brought to the quarries from East St. Louis and the proposed rates were lower than the existing rates from these quarries to East St. Louis, a considerably shorter distance.

He was followed by J. P. Howell, general superintendent of the Mobile and Ohio, who testified further as to operating conditions and the cost of handling the traffic. It was stated that the Mobile and Ohio received a minimum of 30 cents a ton for switching services wherever performed, which was more than the amount it would receive for the service of handling this traffic from the quarries to Vulcan, where it is turned over to the Missouri Pacific.

Testifying for the protestants, the Columbia Quarry Co., H. G. Wilson, the company's traffic manager, compared the proposed rates with those to points beyond the destinations involved and with other hauls for longer mileages and on other commodities of a similar nature to show that the proposals were unduly high. He maintained that on eastbound movement the same services were performed for 10 cents a ton for which it was proposed to charge from 47 to 73 cents a ton, in the tariffs under suspension. He cited other rates which carried the same adjustment through the Ivory Ferry as that which the protestants believed to be proper on limestone. The proposed tariffs would apply as regards destination points in three groups, he said, while the tariffs of coal remained applicable over the St. Louis territory in one group. He said that the average rate for coal on a 63-mile haul was 1.16 and that the tariffs under consideration asked higher rates on limestone for much shorter hauls. On coal, he said, that the arbitrary across the river was 25 cents as compared with the proposed charges, which, he said, ranged from 47 to 83 cents.

Charles P. Tigges, general manager for the protesting quarries, said the installation of the proposed rates would drive his company completely out of the territory involved. He testified as to the competition which his company had to meet and outlined the situation with respect to competing quarries on the west side of the river. —Traffic Word.

CEMENT RATES NOT UNJUST

No revision of cement rates, from Navarro, Pa., to points in northern New Jersey between Navarro and New Jersey tidewater points, and to the latter for local delivery, is deemed necessary by the Commission. It has dismissed No. 13891, Atlas Portland Cement Co. vs. Central Railroad Co. of New Jersey et. al., opinion No. 9043, 85 I. C. C. 611-16, on a finding that rates on portland cement to and between the points mentioned are not unreasonable or otherwise unlawful.

This report also embraces No. 13891 (Sub. No. 1), Same vs. Delaware, Lackawanna & Western Railroad Co. et al.; No. 13891 (Sub. No. 2), Same vs. Central Railroad Co. of New Jersey et al.; No. 13891 (Sub. No. 3), Same vs. Same; No. 13891 (Sub. No. 4), Same vs. Same, and No. 13891 (Sub. No. 5), Same vs. Same. At the hearing complainant asked the dismissal of Sub. Nos. 2 and 5.

The complainant assailed the rates as unreasonable and in violation of the long and short haul part of the fourth section. The vital question was as to the adjustment of rates for local delivery at the Jersey points and the rates for delivery in New York harbor points. To the tidewater terminals, since May 1, 1922, a rate of 7 cents has applied on traffic intended for trans-shipment by water for coastwise or export. On that situation the Commission said:

More than 20 years ago cement manufacturers began to lighter their shipments in New York Harbor either with their own equipment or under contract with independent lighterage companies. About the same time defendants established a difference of 3 cents to New York Harbor lighterage points over the rates to the tidewater terminals. The general increase effective August 26, 1920, made this difference 4 cents. Prior to June 7, 1922, the rate to New York Harbor lighterage points was 14 cents. Effective on that date the rate was reduced to 11 cents, making it the same as the rate to the tidewater terminals for local delivery. On July 1, 1922, it was further reduced to 10 cents. Those 11-cent and 10-cent rates were subject to the following note:

"When New York Harbor lighterage service is performed by the shipper, consignee, or owner, or his agent, an allowance not exceeding 3 cents per 100 lb. will be made therefor."

Complainant contends that this allowance has the effect of transforming the 11-cent and 10-cent rates before and after July 1, 1922, respectively, into local rates to the New Jersey tidewater terminals of 8 and 7 cents, respectively.

Complainant asks for the establishment of rates to New York Harbor lighterage points $1 per ton over the rates to tidewater terminals. At least 95% of the cement from the Lehigh district is lightered by the cement manufacturers in their own equipment or in equipment of lighterage companies with whom they have contracts, on which an allowance of 3 cents per 100 lb. is made Complainant concedes that the carriers' revenue is greater when the shipper performs the lighterage service.

Complainant contends that the allowance can not be authorized under paragraph (13) of section 15 of the act because the handling of the traffic by other than railroad lighters beyond the railroad terminals at the tidewater points is not subject to the tariffs and the jurisdiction of the interstate commerce act and of this commission ends when the cement is unloaded from the cars onto private lighters. It also contends that the assessment of rates to stations in New Jersey intermediate to the tidewater terminals and to those terminals for local delivery, higher than the rates to the terminals when for trans-shipment by water, and higher than the charges resulting after deducting the lighterage allowance from the New York Harbor rates, constitutes a departure from the long-and-short-haul provision of the fourth section of the act. Contention is also made that a similar departure results from the allowance of 15 cents a ton made for unloading lighters, barges, or cars on floats, which is not made when cars are delivered on tracks at the tidewater terminals or intermediate points, where unloading is done by the consignee. These contentions can not be sustained.

In summing up and disposing of the case the Commission said:

Defendants and interveners are opposed to the establishment of a distance scale. They urge, and lay great stress upon the contention, that complainant's real purpose is to effect an increase in the rates from the Lehigh district to New York City and to the New Jersey terminals for beyond in coastwise and export traffic in order that complainant's mill at Hudson, N. Y., could, with its low water rates, drive competitors in the Lehigh district from that large consuming territory.

Interveners question our jurisdiction to enter in order in connection with the portions of the fourth-section application assigned for hearing with these cases, on the ground that the inltial carrier, the Northampton & Bath, is not a party to the proceeding. The publishing agent who filed that application was notified of the proceeding and the hearing. The contention is without merit.

Defendants represented at the hearing asked to withdraw the fourth-section application, stating that as no departure from the provisions of the fourth section now exists there is no application to be heard. No evidence was offered in support of the application and no relief is sought. The application will therefore be denied.

Witness for the Lackawanna points out that a departure from the long-and-short-haul provision of the fourth section exists inasmuch as its rate to Phillipsburg, N. J., is 7 cents and to Oxford Furnace, Bridgeville, Manunka Chunk, and Deleware, N. J., intermediate points the rate is 9 cents. Willingness was expressed to remove this departure, and it should be done forthwith.

We find that the rates assailed were not and are not unreasonable or otherwise unlawful, except that the rate to Phillipsburg over the Lackawanna is unlawful under the fourth section of the act. The complaints will be dismissed.

Commissioner Campbell dissented, but did not set forth his resaons for inability to agree with his colleagues.—Traffic World.

Highway Contractor Should Advise Cement Company Within Reasonable Time If Cement Below Standard

WHERE cement ordered by contractors for use in highway construction was claimed by them to be below the standard of strength, the Michigan Supreme Court holds, People *vs.* Alpha Portland Cement Co., 192 N. W. 787, that it was the duty of the contractors so to advise the cement company within a reasonable time if they desired to escape payment for it. This they did not do, although notified by the state highway commission that a portion of a consignment had failed to meet the test as to tensile strength. Instead, they retained and used this carload the same as the rest without complaint or notice to the cement company for over two years after being advised by the state, and not until sued for its value. It was held they must be deemed to have affirmed its previous acceptance when they O. K.'d the original invoices.—*Public Works.*

Shipping Soapstone from California Quarry

WALTER S. McLEAN of San Francisco, Calif., who is engaged in developing an extensive soapstone deposit near Intake, on the Western Pacific, reported that in 1923 he shipped approximately 1000 tons of soapstone from his Butte county properties. The stone is used principally in the manufacture of patent roofing. High freight rates confine the market for the product to the Pacific coast, but the industry is a promising one and will develop with the growth of the state. Soapstone is a considerable industry in the Eastern part of the United States and it is also imported.

McLean is planning the later development of a limestone deposit in the same neighborhood. He is also engaged in developing a product made from dark green, hard serpentine, which will also be used in the manufacture of roofing.

McLean is the owner of the Crown Ore Mills in San Francisco.—*Sacramento, Calif., Bee.*

New Machinery and Equipment

The Davenport Seven-Ton Gasoline Locomotive

THE Davenport Locomotive Works, Davenport, Iowa, builders of steam locomotives for a quarter of a century, have placed upon the market a new 7-ton gasoline locomotive. This is the first of a complete line that will eventually include 7, 10, 16 and 20 ton sizes.

The Davenport locomotive has several distinct original features, which, it is claimed, are an improvement over other designs. The improvements are:

1. The individual wheel drive makes derailment nearly impossible, except under unusual conditions, and allows the use of Timken bearings, completely encased, to take the side thrust as well as the weight of the locomotive, making exposed hub liners, or thrust bearings, unnecessary.

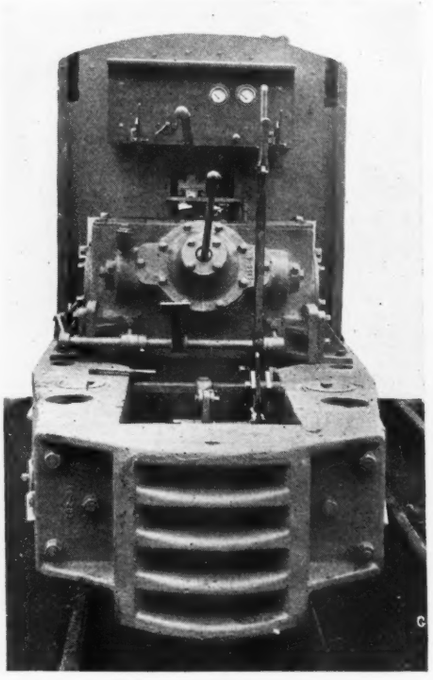
2. The form of transmission used reduces the friction and wear to a minimum. Every part of this, including the final drive chains, is enclosed in an oil-tight, dust-proof housing, and flooded with oil.

Nearly all transmission parts are standard and in case of breakage through accident can be secured through local dealers in mechanical supplies.

The locomotive is in direct drive at all speeds instead of through a train of gears.

The locomotive frame is made of two heavy cast side frames, held together at each end by heavy bumper castings. Each side frame is cast in the form of an inverted "U" strongly ribbed. The driving wheel units run between the walls of the side frames, and in pedestal jaws cast into the walls. Sand boxes are cast into the side frames close to the driving wheels, and only a few inches above the rail, the sand dropping on the rail through short hose without unnecessary momentum.

The driving wheels are made of rolled steel, or of cast wheel centers with rolled steel tires. Each wheel has a short individual axle of large diameter, and is mounted in a single piece cast steel frame or housing, of which the two journal boxes are an integral part. A heavy Timken roller bearing in each journal box takes both the side thrust and weight of the locomotive. A heavy, compact, smooth running, driving wheel unit is thus formed, which is held in close alignment between the walls of the side frame and in wide faced pedestal jaws cast into the walls.



Rear view of locomotive with the cab and seat removed to show the controlling mechanism

Power is transmitted from the final driving sprockets to the driving wheels through short hardened steel shafts, which have at each end a large head of approximately the shape of two intersecting cylinders, having a square cross-section transversely and a circular cross-section longtitudinally. One of these heads fits into a square sleeve in the hub of final driving sprocket and the other head into a similar square sleeve in axle of driving wheel. This flexible connection allows the driving wheel to move several inches out of alignment with the final driving sprockets, and, being free to move in a vertical direction in the pedestal jaw, it easily follows the contour of the roughest track.

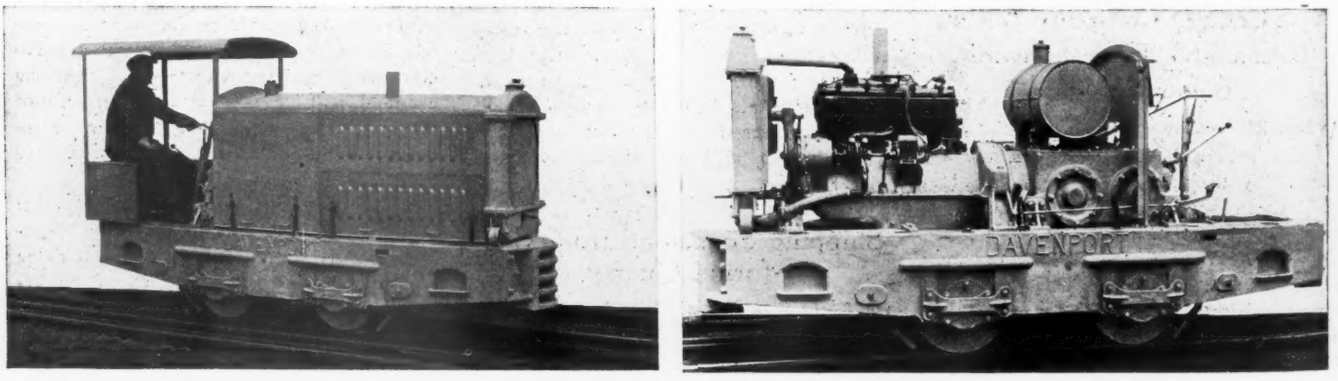
The Timken driving wheel bearings are lubricated by filling the oil-tight enclosure in which the bearings run with soft grease through Alemite fittings, the grease requiring renewal about every 2000 miles. The pedestal jaws are lubricated by filling pockets cast into the top of the journal boxes with oil soaked waste, oil holes leading from the pockets to the pedestal jaws.

The transmission case is made of a large single piece casting, in which—running in an oil bath—is contained the entire transmission mechanism between the clutch and the driving wheels.

For inspection and care when in service, the transmission mechanism is made accessible by a number of large openings in the transmission case. The greater part of the mechanism can be reached through the large opening at the top of the transmission case, and large hand-hole plates at the ends make the final driving sprockets and chains and the bottom of the transmission case accessible.

The sprocket shafts run in Timken bearings carried on the inner face of large retainer caps which cover circular openings through which are installed the assembled sprockets and shafts.

The axles of the final driving sprockets extend through closely fitting openings in the retainer cap, the openings being made



Left: The locomotive on track and ready for service, with hood and cab in place. Right: View with hood removed showing the chassis and the magneto side of the engine

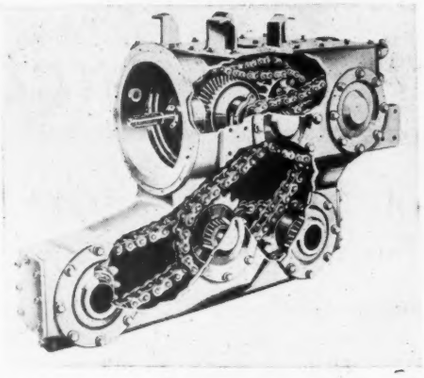
completely oil tight by felt washers pressed into V-shaped grooves in the retainer caps, the felt washers swelling when oil soaked and pressing tightly upon the axle. These washers last several years and are easily renewed when finally worn out.

In order to secure minimum of friction and wear, as well as maximum power and durability, roller chains and sprockets have been adopted wherever possible. The only gears used on the Davenport (except on engine) are the driving pinion on clutch shaft and the forward and reverse ring gears.

Forward and reverse motion of the locomotive is effected by two large bevel gears, or ring gears, which idle on the primary shaft when not in service, and a pinion on main clutch shaft. This pinion runs between the two ring gears, and being meshed with both, drives one in forward, and the other in a reverse direction.

Driving wheel unit showing the heavy semi-elliptical springs on which the machine is supported

A double faced jaw clutch, controlled by the reverse lever in the cab, slides on splines on the primary shaft between the two ring gears, and can be placed in a neutral position, or, when moved into engagement with clutch teeth on inside face of either the forward or reverse gear, drives the primary shaft in the direction desired.



Phantom view of transmission case and mechanism. Roller bearings are used throughout

On the smaller locomotives three speeds are secured by means of three sets of chains and sprockets connecting the primary shaft with the secondary shaft, the sprockets being of the proportionate sizes to secure the speed reductions desired. On the larger locomotives a fourth speed is obtained by adding a fourth set of chain and sprockets.

The 7- and 10-ton models are built in any gage from 23⅝ to 56½ in. The 16- and 20-ton models are built in any gage from 36 to 72 in.

The individual wheel drive construction makes the locomotive easily and cheaply convertible from one gage to another if desirable.

A ¾-Yard Diesel Engine Shovel and Dragline

ONLY a few years ago no mechanical engineer would have dared to predict that a full Diesel type oil engine could be used as the power plant of a steam shovel. Yet the Bucyrus Co. has had one on the market for a year and a half (the 30-B 1-yd. machine) and the success secured with it was so immediate and so great that this company is now putting on a smaller machine of the same type, the 20-B, with a ¾-yd. shovel.

The 30-B shovel has been used in practically every part of the United States and in many foreign countries. The great advantage of this type of shovel is its low fuel costs, and the company states that some of the fuel cost reports are so low as to lead them to believe that the introduction of the Diesel machine has inaugurated a new era in excavating machinery and engineering.

Naturally fuel costs vary greatly with the price and character of the oil that is used and also with the kind of digging. So the company does not care to quote more definite figures than is contained in the statements that the cost of oil runs from one-third to one-quarter that of the cost of gasoline. From experience gained with the 30-B machine it is expected that the 20-B machine will consume from 1½ to 2 gal. per hr., the variation being due to working conditions.

The Diesel engine shovel is not complicated. On the contrary, its simplicity is so apparent that it is about the first thing that strikes one in studying the design. It is a rope thrust machine. All the motions of the dipper are controlled by a small drum mounted under the boom, which is turned in either direction by ropes from the main machinery. Hence there is no independent engine mounted upon the boom nor any complicated thrusting device. The dipper is as perfectly controlled as on a steam machine and the whole power of the main engine may be put behind the thrust.

The engine is a 45-hp. mechanical injection, 3-cylinder engine, designed and built especially for this service. The whole machine is ruggedly built and intended to stand up to heavy duty as well as average service.

The 20-B may be had as a shovel with standard, high-lift or extra high-lift booms, as a dragline excavator, a clamshell excavator with a 35 and 42-foot boom, or with crane equipment.

Bulletin B-201, describing this machine, may be obtained by addressing the Bucyrus Company, South Milwaukee, Wisconsin, the makers of the machine.

These cuts show that the Diesel engine powered shovel can be used equally well as a clamshell or dragline excavator and also that it can handle itself over exceedingly difficult footing

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.40	1.40	1.40	1.30	.....
Buffalo, N. Y.			1.50 per net ton all sizes			
Chaumont, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	.....
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Prospect, N. Y.	.80	1.40	1.40	1.30	1.30	.....
Watertown, N. Y.	.50	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill.	1.75	.....	1.75	1.50	.....	.....
Buffalo, Iowa	1.00	.....	1.45	1.25	1.30	1.30
Chicago, Ill.	.80	1.40	1.10	1.10	1.10	1.10
Dundas, Ont.	.90	1.35	1.35	1.25	1.10	1.10
Greencastle, Ind.	1.25	1.15	1.05	1.05	1.00	1.00
Lannon, Wis.	.70	1.00	1.00	1.00	.90	.90
St. Vincent de Paul, P. Q.	.85	1.20@1.45	1.15	1.05	.95	.95
Sheboygan, Wis.	.90	.....	1.10	1.00	.....	.....
Stone City, Iowa	.75	.....	1.50†	1.40	1.30	.....
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Canada	1.90‡	2.25‡	2.25‡	2.25‡	2.00‡	2.00‡
Waukesha, Wis.	1.15	1.15	1.15	1.15	1.15	1.15
SOUTHERN:						
Alderson, W. Va.	.60	1.75	1.75	1.50	1.40	.....
Bridgeport and Chico, Texas	1.00	1.35	1.35	1.35	1.25	1.20
Cartersville, Ga.	1.75	1.50	1.50	1.15	1.15	1.10
El Paso, Texas	1.00	1.00	1.00	1.00	.....	.....
Ft. Springs, W. Va.	.60	1.70	1.70	1.60	1.50	.....
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	.....
Graysville, Ga.	1.00@1.25	.80@1.00	.....	.75@1.00	.75@1.00	.....
Rock Crusher, Ky.	1.50	1.25	1.25	1.25	1.25	1.15
WESTERN:						
Blue Spr'gs and Wymore, Neb.	.20	1.45	1.45	1.35@1.40	1.25@1.30	1.20
Cape Girardeau, Mo.	1.35*	1.25*	1.25*	1.25*	1.00*	.....
El Centro, Calif.	1.75	1.75	1.75	1.75	1.75	1.75
Kansas City, Mo.	1.00	1.65	1.65	1.65	1.65	1.65

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.60	1.35	1.15	1.00	.....
E. Summit, N. J.	2.00	.....	.....	1.80	.....	.....
Eastern Massachusetts	.85	1.75	1.75	1.40	1.40	1.40
Eastern New York	.75	1.50	1.50	1.30	1.40	1.30
Eastern Pennsylvania	1.25	1.55	1.50	1.40	1.40	1.40
Meriden, Middlefield, New Britain, Rocky Hill, Conn.	.60	1.60@1.75	1.35@1.50	1.15@1.25	1.00@1.10	1.00@1.10
Oakland, Calif.	1.00	1.00	1.00	.90	.90	.....
Richmond, Calif.	.50*	.....	1.65*	1.50*	1.50*	.....
San Diego, Calif.	.50@.75	1.80@1.90	1.60@1.80	1.35@1.55	1.35@1.55	1.25@1.45
Springfield, N. J.	2.00	2.50	.....	1.80	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley and Red Granite, Wis.	1.60	1.70	1.60	1.50	1.40	.....
Columbia, S. C.	.50	.....	2.00	.....	1.60	.....
Eastern Penna.—Sandstone	.85	1.60	1.55	1.35	1.35	1.30
Eastern Penna.—Quartzite	1.20	1.35	1.20	1.20	1.20	1.20
Lithonia, Ga.—Granite	.75	1.75	1.75	1.25	1.25	1.25
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@2.00
Sioux Falls, S. D.—Granite	1.00	1.60	1.55	.....	1.50	.....

*Cubic yd. †1 in. and less. ‡Prices include 90c freight.

Agricultural Limestone

(Pulverized)

Cassadaga, N. Y.—Marl, 50 lb. hemp bags ..... 7.00@ 9.00

Chaumont, N. Y.—Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$—Thru 100 mesh; sacks, 4.50; bulk 3.00

Branchton, Pa.—100% thru 20 mesh; 80% thru 50 mesh; 60% thru 100 mesh (Four Leaf Clover Brand); sacks, 5.00; bulk 3.50

Hillsville, Pa.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; 94% thru 50 mesh; sacks, 5.00; bulk 3.50

Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk 2.50

Watertown, N. Y.—Analysis 96-99% $CaCo_3$; 0.02% $MgCo_3$—90% thru 100 mesh, bags, 4.50; bulk 3.00

New Castle, Pa.—94% $CaCO_3$, 1.40% $MgCO_3$—75% thru 100 mesh, 94% thru 50 mesh; sacks, 5.00; bulk 3.50

West Stockbridge, Rockdale, Mass., North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk 3.25

Alton, Ill.—Analysis, 98% $CaCO_3$; 0.5% $MgCO_3$; 90% thru 100 mesh 6.00

Belleville, Ont.—Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk 2.50

Cypress, Ill.—Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$; 50% thru 100 mesh, 90% thru 50 mesh, 50% thru 50 mesh, 90% thru 4 mesh 1.50

Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 80-lb p. sacks 5.00; bulk 3.50

Piqua, Ohio—Total neutralizing power 95.3%; 100% thru 10, 60% thru 50; 50% thru 100 ..... 2.10@ 2.25

100% thru 10, 90% thru 50, 80% thru 100; bags, 5.00; bulk 3.50

100% thru 100, 85% thru 200; bags, 7.00; bulk 5.50

Waukesha, Wis.—Analysis, neutralizing equivalent 107.38% $CaCO_3$; 99% thru 10 mesh, 55% thru 60 mesh; bulk 2.35

200-mesh bags ex., returnable 4.50

Hot Springs, N. C.—50% thru 100 mesh; sacks, 4.25; bulk 2.70

Knoxville, Tenn.—80% thru 100 mesh, bags, 3.95; bulk 2.70

Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200 lb. burlap bag, 4.00; bulk 2.75

Mountville, Va.—Analysis, 76.60% $CaCO_3$, 22.83% $MgCO_3$—50% thru 100 mesh; 100% thru 20 mesh; sacks 5.00

Colton Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk 4.00

Lemon Cove, Calif.—Analysis, 94.8% $CaCO_3$, 0.42% $MgCO_3$; 60% thru 200 mesh; sacks, 5.25; bulk 4.50

Dundas, Ont.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$—35% thru 100 mesh; 50% thru 50 mesh; 100% thru 10 mesh; bagged, 4.75; bulk 3.00

Agricultural Limestone

(Crushed)

Bellevue, Ohio—Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; ¼ in. to dust, about 20% thru 100 mesh 1.25

Bettendorf, Iowa, and Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh 1.50

Buffalo, Iowa—90% thru 4 mesh 1.00

Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 90% thru 50 mesh 1.50

Cartersville, Ga.—Analysis, 60% $CaCO_3$; 36% $MgCO_3$—all passing thru 10 mesh ..... 1.50@ 1.75

Carthage, Mo.—Analysis, 98½% $CaCO_3$; 100% thru 10 mesh, 30% thru 100 mesh 1.75

Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$; 90% thru 4 mesh ..... .80

Elmhurst, Ill.—Analysis, 35.73% $CaCO_3$, 20.69% $MgCO_3$; 50% thru 50 mesh 1.25

Huntington and Bluffton, Ind.—Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; about 20% thru 100 mesh 1.25

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Greencastle, Indiana.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	2.00
Kansas City, Mo.—50% thru 100 mesh	1.25
Krause and Columbia, Ill.—Analysis, 90% $CaCO_3$, 90% thru 4 mesh	1.20
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 100% thru 4 mesh; 83% thru 10 mesh; bulk	1.25
Milltown, Indiana.—Analysis, 94.41% $CaCO_3$; 2.95% $MgCO_3$; 35% thru 50 mesh	1.40@ 1.65
Monroe, Mich.—Analysis, 51.91% $CaCO_3$, 44.17% $MgCO_3$; agricultural limestone meal, 3/16 in. to dust, 30% thru 100 mesh	1.60
Narlo, Ohio.—Analysis, 56% $CaCO_3$, 43% $MgCO_3$; limestone screenings, 37% thru 100 mesh, 55% thru 50 mesh, 100% thru 4 mesh	1.50@ 2.00
Ohio (different points), 20% thru 100 mesh; bulk	1.25@ 1.50
Piqua, Ohio—100% thru 4 mesh	1.25
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stolle, Ill., near East St. Louis on I. C. R. R.—Thru ½-in. mesh	1.30
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Waukesha, Wis.—No. 1 kiln dried	2.00
No. 2 Natural	1.75
Alderson, W. Va. — Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Claremont, Va.—Analysis, 92% $CaCO_3$, 2% $MgCO_3$; 90% thru 50 mesh	3.00
50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh	2.75
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 100 mesh	1.50
Garnett, Okla.—Analysis, 80% $CaCO_3$, 3% $MgCO_3$; 100% thru 4 mesh	.50
Kansas City, Mo., Corrigan Siding—50% thru 100 mesh; bulk	1.80
Tulsa, Okla.—90% thru 4 mesh	.50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

Glass Sand:	
Berkeley Springs, W. Va	2.25@ 2.50
Cheshire, Mass.—24 mesh, 5.00; 40 mesh, 6.00; 100 mesh	7.00
Columbus, Ohio	1.50@ 1.75
Dunbar, Pa.—Damp	2.50
Falls Creek, Pa.	2.25
Hancock, Md.—Damp, 1.50; dry	2.00
Mapleton, Pa.	2.25@ 2.50
Mapleton Depot, Pa.	2.00@ 2.25
Massillon, Ohio	3.00
Michigan City, Ind.	.50
Millville, N. J.	2.00
Mineral Ridge, Ohio	2.50
Ottawa, Ill.	1.25@ 1.50
Pacific, Mo.	2.25@ 3.00
Pittsburgh, Pa.—Dry, 4.00; damp	3.00
Ridgway, Pa.	2.50
Rockwood, Mich.	2.75@ 3.25
Round Top, Md.	2.25
Sands, Pa.	2.50
San Francisco, Calif.	3.00@ 3.50
St. Louis, Mo.	2.25@ 3.00
Thayers, Pa.	2.50
Utica, Ill.	1.25@ 1.50
Zanesville, Ohio	2.50
Foundry Sand:	
Albany, N. Y. — Molding fine, brass molding	3.00
Molding coarse	2.75
Sand blast	4.00
Allentown, Pa.—Core and molding fine	1.75@ 2.00
Arenzville, Ill.—Molding fine	1.50@ 1.75
Brass molding	1.75
Beach City, Ohio.—Core, washed and screened	2.00@ 2.50
Furnace lining	2.50@ 3.00
Molding fine and coarse	2.25@ 2.50
Cheshire, Mass.—Furnace lining, molding fine and coarse	5.00
Sand blast	5.00@ 8.00
Stone sawing	6.00
Cleveland, Ohio—Molding coarse	1.50@ 2.00
Brass molding	1.50@ 2.00
Molding fine	1.50@ 2.25
Core	1.25@ 1.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge and So. Hts., Pa.	1.25	1.25	1.15	.85	.85	.85
Buffalo, N. Y.	1.10	.95			.85	
Erie, Pa.		1.00		1.25		1.75
Farmingdale, N. J.	.68	.68	.75		1.30	
Pittsburgh, Pa.	1.25	1.25	1.00	1.00	.85	.85
Portland, Me.		.50	1.75		1.35	1.25
Washington, D. C.—Rewashed, river	.75	.75	1.60	1.40	1.20	1.20
CENTRAL:						
Columbus, Ohio	.75	.75@1.10	.75	.75@1.00	.75@1.00	.75
Covington, Ind.	.75	.75	.75	.75	.75	.75
Des Moines, Iowa	.50	.50	1.25	1.60	1.60	1.60
			Unwashed ballast, .50 ton			
Attica, Ind.	.75	.75	.75	.75	.75	.75
Eau Claire, Wis.	.40	.40	.85@1.35			.85@ .95
Elkhart Lake, Wis.	.60	.60	.70	.70	.70	.70
Grand Rapids, Mich.		.50		.80		.70
Hamilton, Ohio		1.00			1.00	
Hersey, Mich.		.50				.70
Indianapolis, Ind.	.60	.60		1.50	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Mason City, Iowa	.65	.65	1.70	1.70	1.65	1.65
Mankato, Minn.	.40a	.40	.50†			
Milwaukee, Wis.	1.11	1.11	1.36	1.36	1.36	1.36
Moline, Ill.	.60	.60	Concrete gravel, 40% G., 60% S., .90			
Palestine, Ill.	.75	.75	.75	.75	.75	.75
St. Louis, Mo., f.o.b. cars	1.20	1.45	1.65§	1.45		1.45‖
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
Summit Grove, Ind.	.75	.75	.75	.75	.75	.75
Terre Haute, Ind.	.75	.75	.90	.90	.75	.75
Waukesha, Wis.	.50	.50	.80	.80	.80	.80
Winona, Minn.	.40	.40	1.75	1.50	1.40	1.40
			(.05 ton discount 10 days)			
SOUTHERN:						
Brookhaven, Miss.; Roseland, La.		.25			1.00	
Charleston, W. Va.	all sand 1.40 f.o.b. cars		all gravel 1.50 f.o.b. cars			
Ft. Worth, Texas	2.25	2.25	2.25	2.25	2.25	2.25
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.20
Lake Weir, Fla.		.50				
New Martinsville, W. Va.	1.00	1.00		1.20		.80
WESTERN:						
Kansas City, Mo.			Kaw river sand .75 per ton f.o.b. plants			
Los Angeles, Calif.		.85@1.15	1.00@1.25	1.00@1.25	1.00@1.25	
Pueblo, Colo.	1.10*	.90*		1.60*	1.60*	
San Diego, Calif.	.50@.65	.80@.90	1.40@1.50	1.20@1.30	1.00@1.10	1.00@1.10
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*		1.50*	1.50*
Webb City, Mo.	.75	.75	.25@ .75b		1.25c	1.15c

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Brookhaven, Miss., Rosel'd, La.	.75	.50			1.25	
Dudley, Ky.‡	1.05	1.05		1.00		
Elkhart Lake, Wis.	.60	.50				
Fishers, N. Y.	.60		.60			.50
Gainesville, Texas		.95				.55
Grand Rapids, Mich.						.60
Hamilton, Ohio					.70	
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Texas		.95				.55
Mankato, Minn.			Pit run gravel, .50			
Moline, Ill.	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
St. Louis, Mo.						1.55
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.	.60	.60	.60	.60	.60	.60
Indianapolis, Ind.		.95@1.20	(crushed rock)			
Zanesville, Ohio		.60	.60			
York, Pa.						

*Cubic yd.; †pit run; §⅝ in. and less; ‡crushed rock; ‖2½ in. and less; (a) ¾ in. and less; (b) flint chats; (c) crushed flint.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, O.	2.05	1.45	1.45	1.45	1.45	1.45	1.45
Jackson, O.		1.35		1.35	1.35	1.35	1.35
Toledo, O.	1.50	1.35	1.50	1.35	1.35	1.35	1.35
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.35	1.25	1.25	1.25	1.25
SOUTHERN:							
Alabama City, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ashland, Ky.		1.55	1.55	1.55	1.55	1.55	1.55
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Adams, Mass.			7.00				2.90	
Bellefonte, Pa.		10.50*	10.50*	10.50*	9.00		8.50	1.80
Buffalo, N. Y.				12.00				
Berkeley, R. I.			12.00					2.30
Lime Ridge, Pa.							5.00a	
West Stockbridge, Mass.								2.25
Williamsport, Pa.			10.00				6.00	
York, Pa. (dealers' prices)		10.50	10.50	11.50			8.50	1.65b
CENTRAL:								
Cold Springs, Ohio	12.50	11.00	10.00		9.00	11.00‖	10.00	
Delaware, Ohio	12.50	10.00	9.00	11.00			9.00	1.60
Gibsonburg, Ohio	12.50				9.00			
Huntington, Ind.	12.50	11.00	10.00				10.00	1.60c
Luckey, Ohio	12.50‡	11.00	10.00‡					1.60
Marblehead, Ohio		11.00	10.00				10.00	1.60d
Marion, Ohio		11.00	10.00				10.00	1.80†
Sheboygan, Wis.							9.50	10.25g
Tiffin, Ohio					9.00			
White Rock, Ohio	12.50				9.00	11.00		
Woodville, O. (dlrs.' price)	12.50‡	10.00f	9.00‡	12.50	9.00	10.50	9.00f	1.60
SOUTHERN:								
Erin, Tenn.							8.00	1.25
El Paso, Texas							9.00	1.50
Karo, Va.							7.00	1.50
Knoxville, Tenn.	12.50	11.00	11.00	11.00	8.50		8.50	1.50
Ocala and Zuber, Fla.	13.00		9.00		11.00		10.00	1.70
Staunton, Va.					4.50		8.50	1.35
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland, N. M.							15.00	
San Francisco, Calif.	22.00	22.00		22.00				2.50
Tehachapi, Calif.							13.00	2.10e

*Paper sacks; †180-lb. net, non-returnable metal barrel; ‡50-lb. paper bags, terms 30 days net, 25c per ton or 5c per bbl. discount for cash in 10 days from date of invoice; ‖ 80-lb. paper bags; (a) F. O. B. kilns; (b) 180 lb. net, 2.65, 250 lb. net; (c) wooden bbl.; (d) wooden, 1.60, steel, 1.80; (e) wooden bbl., steel bbl., 2.20; (f) F. O. B. Marion; (g) ton.

Miscellaneous Sands

(Continued from preceding page)

Columbus, Ohio—Core	.50@ 2.00
Furnace lining	2.00@ 2.50
Molding fine and coarse	1.50@ 2.50
Sand blast	3.50@ 5.50
Stone sawing	1.50@ 1.75
Traction	.50@ 1.50
Brass molding	2.00@ 3.00
Delaware, N. J.—Molding fine	2.00
Molding coarse	1.90
Brass molding	2.15
Dunbar, Pa.—Traction	2.50
Dundee, Ohio.—Glass, core, sand blast traction	2.50
Molding fine, brass molding (plus 75c for winter loading)	2.00
Molding coarse (plus 75c for winter loading)	1.75
Eau Claire, Wis.—Sand blast	3.25
Traction	.50@ .85
Falls Creek, Pa.—Molding, fine and coarse	1.75
Sand blast	2.00
Traction	1.75
Franklin, Pa.—Core	2.00
Furnace lining	2.50
Molding coarse	2.00
Brass molding	2.75
Joliet, Ill.—No. 2 molding sand and loam for luting purposes; milled	.80
Bank run	.65
Kansas City, Mo.—Missouri river core	.80
Kasota, Minn.—Sand blast, stone sawing	1.50
Mapleton Depot, Pa.—Molding fine	2.00@ 2.50
Traction	2.00@ 2.25
Roofing sand	2.25
Massillon, Ohio—Molding fine, coarse, furnace lining and core	3.00
Traction	2.75
Michigan City, Ind.—Core	.50@ .55
Traction	.40
Millville, N. J. Core	2.00
Mineral Ridge, Ohio—Furnace lining, molding fine and coarse, roofing sand, sand blast, stone sawing, core, traction (green)	2.00
Montoursville, Pa.—Core	1.50@ 1.75
Molding fine and coarse	2.00
Traction	1.25
Brass molding	2.50
New Lexington, Ohio—Molding fine	2.75
Molding coarse	2.50
Ottawa, Ill.—Core, furnace lining, steel molding	1.50
Roofing sand	1.50@ 4.50
Sand blast	4.50
Ottawa, Minn.—Crude silica sand	.75@ 1.00
Pacific, Mo.—Core, furnace lining	1.00@ 1.25
Molding fine	.90@ 1.00
Stone sawing	1.00@ 1.75
Ridgway, Pa.—Core	2.00
Furnace lining, molding fine, molding coarse	1.25
Traction	2.25
Rockwood, Mich.—Roofing sand	3.00
Sand blast	3.75
Round Top, Md.—Roofing sand	2.25
Traction	1.75
Core	1.60

Miscellaneous Sands

(Continued)

San Francisco, Calif. (washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@ 3.50
(Direct from pit)	
Furnace lining, molding coarse, sand blast	3.60
Stone sawing, traction	2.30
Tamalco, Ill.—Molding coarse	1.40@ 1.60
Thayers, Pa.—Core	2.00
Furnace lining	1.25
Molding fine and coarse	1.25
Traction	2.25
Utica, Ill.—Core (crude and dry)	.85@ 1.50
Furnace lining, molding fine and coarse (crude and dry), brass molding	.85@ 1.50
Roofing sand, stone sawing	1.00@ 2.50
Sand blast	2.50
Traction	1.25
Warwick, Ohio—Core, green, 2:00; dry	2.50
Molding fine, molding coarse, green, 2.00; dry	2.50
Traction	2.50
Zanesville, Ohio—Molding fine	2.00@ 2.50
Brass molding	2.00@ 3.00
Core, molding coarse	2.25@ 2.50
Furnace lining, molding steel	2.00
Traction	2.50

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Asheville, N. C.—Best white and 200-mesh (per ton)	8.00
Yellow (per ton)	9.00
Red (per ton)	13.00
Baltimore, Md.—Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	55.00
Blanks (per lb.)	.08
Pencils and steel workers' crayons, per gross	1.25
Chatsworth, Ga.—Crude talc (grindings)	6.00
Crude (gray)	4.50@ 5.00
Ground (60-80 mesh) (bags extra)	6.50@ 7.50
Ground (150-200 mesh), bulk	8.00@15.00
Pencils and steel workers' crayons, per gross	1.50@ 2.50
Chester, Vt.—Ground talc (150-200 mesh), bulk	8.00@ 9.00
Including bags	9.00@10.00
Emeryville, N. Y.—(325 mesh), bags	14.75
Hailesboro, N. Y.—Ground talc (150-250 mesh), bags	18.00
Henry, Va.—Crude talc (mine run) per 2000-lb. ton	2.75@ 3.50
Ground (150-200 mesh), bags	10.00@14.00
Keeler, Calif.—(150-200 mesh); carloads, 6000-lb. (bags extra)	18.00@30.00
Los Angeles, Calif.—Crude	15.00@22.00
Marshall, N. C.—Crude (gray)	4.50@ 5.00
Ground (60-80 mesh) (bags extra)	6.50@ 7.50
Ground talc (150-200 mesh); bags	8.00@12.00
Natural Bridge, N. Y.—Ground talc (300-325 mesh), 200 lb. bags	13.00@15.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
Ground talc (150-200 mesh), bulk	10.00@22.00
Vermont—Ground talc (20-50 mesh); bags	7.50@ 8.50
Ground talc (150-200 mesh); bags	10.00@16.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	7.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.50
(Bags extra)	
Pencils and steel workers' crayons, per gross	1.20@ 2.50

Rock Phosphate

(Raw Rock)

Per 2240-lb. Ton

Centerville, Tenn.—B.P.L. 65%, bags	8.50
Bulk	6.50
Gordonsburg, Tenn.—B.P.L. 68-72%	5.50@ 6.00
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.	5.50
Paris, Idaho.—2000 lb. mine run, B.P.L. 75%	4.50@ 5.00
Ottawa, Minn.—All crude silica sand	.75@ 1.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Clay Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$10.20	$10.00	$8.10	$7.80
24x14	10.20	10.00	8.10	7.80
22x12	10.80	10.00	8.40	8.75
22x11	10.80	10.50	8.40	8.75
20x12	12.60	10.50	8.70	8.75
20x10	12.60	11.00	8.70	8.75
18x10	12.60	11.00	8.70	8.75
18x 9	12.60	11.00	8.70	8.75
16x10	12.60	11.00	8.40	8.75
16x 9	12.60	11.00	8.40	8.75
16x 8	12.60	11.00	8.40	8.75
18x12	12.60	11.00	8.70	8.75
16x12	12.60	11.00	8.40	8.75
14x10	11.10	11.00	8.10	7.80
14x 8	11.10	10.50	8.10	7.80
14x 7 to 12x6	9.30	10.50	7.50	7.80
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

(Ground Rock)

Wales, Tenn.—B.P.L. 70%	7.75
Per 2000-lb. ton	
Barton, Fla.—Analysis, 50-65% B.P.L.	3.50@ 8.00
Mt. Pleasant, Tenn.—B.P.L. 65%	6.50
Twomey, Tenn.—B.P.L. 65%	6.00@ 6.50

Florida Soft Phosphate

(Raw Land Pebble)

Per Ton

Florida—F. O. B. mines, gross ton, 68/66% B.P.L.	2.50
70% min. B.P.L.	2.75
72% min. B.P.L.	3.00
75/74%	4.00
77/76%	5.00
Jacksonville (Fla.) District	10.00@12.00

(Ground Land Pebble)

Per Ton

Jacksonville (Fla.) District	14.00
Add 2.50 for sacks.	
Morristown, Fla.—26% phos. acid	16.00
Mt. Pleasant, Tenn.—65% B.P.L.	5.75

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	22.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	23.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Barton, Wis., f.o.b. cars		10.50
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Slate granules		6.50@ 7.00
Granville, N. Y.—Red slate granules		7.50
Harrisonburg, Va.—Blk. marble (crushed, in bags)	12.50@14.50	12.50@14.50
Ingomar, Ohio (in bags)		6.00@16.00
Mertztown, Pa. (granite) bags, $10.00; bulk		8.00
Milwaukee, Wis. (del.)		14.00@28.00
Newark, N. J.—Roofing granules		7.50
New York, N. Y.—Red and yellow Verona		32.00
Middlebrook, Mo.—Red		25.00@30.00
Phillipsburg, N. J.—Evergreen, bulk	8.00@10.00	8.00@10.00
Creme and royal, bulk	15.00@20.00	15.00@20.00
Poultney, Vt.—Slate granules		7.50
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.—(2000 lb.)		7.00@20.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b. cars, granite	4.50@ 6.00	4.50@ 6.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@35.00
Carpenterville, N. J.	19.00	31.50@45.00
Ensley, Ala. ("Slagtex")	16.00	26.00
Eugene, Ore.	25.00	35.00@70.00
Friesland, Wis.	21.00	32.00
Omaha, Neb.	18.00	30.00
Portland, Ore. (Del'd)	21.00	45.00@55.00
Puyallup, Wash.	20.00	30.00@75.00
Rapid City, S. D.	18.00	22.50@40.00
St. Paul, Minn.	15.00	35.00
Watertown, N. Y.	18.00@21.00	32.00@35.00
Wauwatosa, Wis.	15.00@16.00	28.00@75.00
Winnipeg, Can.	18.00	26.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass.	15.00@16.50
Dayton, Ohio	12.50@13.50
Grand Rapids, Mich.	11.00
Lancaster, N. Y.	14.00
Michigan City, Ind.	11.00
Milwaukee, Wis. (delivered)	14.00
Portage, Wis.	15.00
Rives Junction and Saginaw, Mich.	12.00
Syracuse, N. Y. (delivered at job)	20.00
F.o.b. cars	15.00@16.00

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finishing	Common
Atlanta, Ga.	22.50	14.00
Baltimore, Md.	24.25	17.85
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	20.00
Dallas, Tex.	20.00	.....
Denver, Colo.	24.00	.....
Detroit, Mich.	20.00	19.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	21.00	21.00
New York, N. Y.	18.20	13.10
St. Louis, Mo.	19.00	19.00
San Francisco, Calif.	22.00	.....
Seattle, Wash. (paper sacks)	24.00	.....

Portland Cement

Prices per bbl. and per bag net in carload lots.

	Per Bag	Per Bbl.
Atlanta, Ga.	.....	2.60
Boston, Mass.	.....	2.53@2.63
Buffalo, N. Y.	.....	2.38@2.48
Cedar Rapids, Iowa	.60	2.40
Cincinnati, Ohio	.59¼	2.37
Cleveland, Ohio	.60¼	2.41
Chicago, Ill.	.55	2.20
Columbus, Ohio	.....	2.44
Dallas, Texas	.53¾	2.15
Davenport, Iowa	.57¼	2.29
Dayton, Ohio	.....	2.44
Denver, Colo.	.....	2.84
Detroit, Mich.	.59¼	2.37
Duluth, Minn.	.54¾	2.25
Indianapolis, Ind.	.57¾	2.31
Kansas City, Mo.	.56¾	2.37
Los Angeles, Cal. (less 5c dis.)	.77	3.08
Memphis, Tenn.	.....	2.60
Milwaukee, Wis.	.58¾	2.35
Minneapolis, Minn.	.60½	2.42
Montreal, Canada (sks. 20c ext.)	.....	2.25
New Orleans, La.	.....	2.90
New York, N. Y.	.....	2.15
Philadelphia, Pa.	.....	2.31
Phoenix, Ariz.	.82½	3.30
Pittsburgh, Pa.	.54¾	2.19
Portland, Ore.	.....	3.05
San Francisco, Cal.	.....	2.61
St. Louis, Mo.	.55	2.20
St. Paul, Minn.	.60½	2.42
Seattle, Wash. (10c bbl. dis.)	.....	2.90
Toledo, Ohio	.60	2.33

NOTE—Add 40c per bbl. for bags.

Mill prices f. o. b. in Carload Lots to Contractors

	Per Bag	Per Bbl.
Buffington, Ind.	.46¼	1.95
Cincinnati, Ohio	.....	3.00†
Concrete, Wash.	.....	2.60
Dallas, Texas	.....	2.05
Dayton, Ohio	.....	2.85†
El Paso, Tex.	.70	2.08*
Hannibal, Mo.	.....	1.95
Hudson, N. Y.	.....	2.05
Indianapolis, Ind.	.....	2.96†
Leeds, Ala.	.....	1.95
Los Angeles, Calif.	.....	2.65
Louisville, Ky.	.....	2.35
Memphis, Tenn.	.....	3.24†
Northampton, Pa.	.....	1.95
Phoenix, Ariz.	.....	4.30‡
Steelton, Minn.	.50	2.06
Universal, Pa.	.48¼	2.00

*Gross, 10c sacks and 10c per bbl. disc 10 days.
†Including cloth sacks.
‡Gross, 15c sacks and 5c per bbl. disc. 10 days

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	¼x32x36" Plaster Board Weight 1500 lb. Per M Sq. Ft.	⅜x32x36" Plaster Board Weight 1850 lb. Per M Sq. Ft.	⅜x32 or 48" Wallboard, Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Black Hawk, S. D.	3.50	.....	7.00	8.00	10.00	10.50	.....	.....	.....	.....	.....	.....	.....
Douglas, Ariz.	.....	6.00	6.00	.....	13.00	.....	.....	.....	.....	.....	.....	.....	.....
Fort Dodge, Iowa	3.00	3.50	6.00	8.00	10.00	10.50	20.00	.....	21.30	20.00	20.00	.....	30.00
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	10.00	.....	7.00	.....	.....	.....	20.00	.....
Grand Rapids, Mich.	3.00	.....	5.00	10.00	10.00	10.00	.....	.....	31.00	.....	19.75	20.00	30.00
Hanover, Mont.	4.50	.....	6.00	10.00	.....	10.50	.....	.....	.....	.....	.....	.....	.....
Mound House, Nev.	.....	8.50	6.50	10.50@11.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00+	30.75	21.00	19.375	20.00	30.00
San Francisco, Calif.	.....	.....	.....	16.40	.....	.....	.....	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Bags, 10c each; Paper Bags, $1.50 per ton extra (not returnable).
*Shipment in bulk 25c per ton less; ‡Bond plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding $0c per ton

News of All the Industry

Incorporations

Albany Crushed Stone Corp., Albany, N. Y., $200,000 to $400,000.

Louisville Cement Co., Louisville, Ky., from $2,100,000 to $2,225,000.

Crown Rock Asphalt Co., Cincinnati, Ohio, $150,000 preferred authorized.

Dubois & Fils, Laurierville, Que., have been registered. They manufacture cement bricks.

France Quarries Co., Toledo, Ohio, has increased its capital from $130,000 to $205,000.

The Winchester Gravel Co., Winchester, Ind., has filed certificate of preliminary dissolution.

Camgros Gravel Co., San Rafael, Calif., capital stock, $25,000; shares, 250; subscribed, $20,100.

Grand Rapids Plaster Co., Grand Rapids, Mich., has increased its capital stock from $400,000 to $500,000.

T. Rogers, 1761 Iberville street, Montreal, is purchasing crushing and screening equipment for a quarry.

Brandin Slate Co. has increased its capital stock from $10,000 to $50,000. It is located in New Orleans, La.

Brooks Cement Products Co. has been incorporated by Mrs. S. H. Phillips and associates of Memphis, Tenn.

T. C. Hubbert & Co., $50,000, quarries, etc. Incorporated by Tilghman C. Hubbert and others of Baltimore, Md.

The Mohawk Sand and Gravel Co., Ltd., Brantford, Ont., Canada, has increased its capital from $40,000 to $75,000.

Johnson Bros. Concrete Block and Construction Co. has been incorporated in Duluth, Minn., with a capital of $50,000.

Southwestern Lime Co., Benbrook, Ky.; capital stock, $25,000; incorporators, W. H. Slay, U. M. Simon, M. E. Smith.

La Joya Gravel Co., Mission, Texas; capital stock $10,000. Incorporators: R. R. Stephens, S. M. Hargrove, W. S. West.

Brownell Sand and Gravel Co. has been incorporated by George Brownell, Esther Brownell and Earl Brownell, all of Umatilla, Ore.

Houston Graphite Co., Boston, Mass.; capital stock, $100,000; state headquarters at Houston, Texas; state agent, C. A. Wheeler, Houston.

Edgerton Concrete Products Co. has been incorporated in Wilson, N. C., with a capital of $100,000, by Yates and Claude Edgerton and others.

Doe River Sand Co., Inc., Johnson City, Washington county, Tenn., has filed an amendment increasing its capital stock to $10,000 from $2000.

Moffett Sand and Gravel Co., $50,000; George E. Johnson, Arthur W. Moffett, Margurite Moffett, Lincoln, Neb. (Corporation Trust Co. of America.)

Port Huron Sand and Gravel Co. has been incorporated in Port Huron, Mich., with a capital stock of $40,000, with headquarters at 1514 Military street.

Neary & Co. have incorporated in the sand and gravel business in Seattle, Wash., with a capital of $10,000. Incorporators are Edwin Neary and L. Parcher.

Valley View Sand and Gravel Co., Brunswick-Rensselaer county, N. Y., $50,000; S. J. Brown, B. L. and J. R. Robinson. (Attorneys, Roche, Tierney & Roche, Troy.)

Artificial Marble Stone Co., Ltd., Montreal, has been incorporated with a capital of $99,000 to carry on the business of manufacturers and dealers in artificial marble and stone.

The Baldwin Stone Co. has been incorporated in Richmond, Va., with a capital stock of $10,000. R. D. Baldwin of Shores, Va., is president, and Wylie R. Cook of Chattanooga, Tenn., is secretary.

Mission Rock Co., capital stock, $100,000; directors: J. A. Donohoe, W. J. Dutton, C. de Guigne, E. E. Kentfield and A. M. Simpson, 5 shares each; place of business San Francisco, Calif.

Red Star Cement Co., Music Hall building, LaSalle, Ill. Manufacture and sell portland cement, deal in building materials. Incorporators: P. J. Lucey, Gerald G. Barry, Bernhardt Frank, John C. Farwell. Correspondent: Red Star Cement Co., Music Hall building, LaSalle, Ill.

Tennessee Roofing Tile Co., of Knoxville, Tenn., has increased its capital stock from $10,000 to $50,000, and has changed its name to Knoxville Roof Tile and Concrete Co., and will establish a branch plant in Memphis, Tenn., and probably one in Chattanooga, Tenn. Dr. M. M. Copenhaver, of Knoxville, is president.

Sand and Gravel

A new county gravel crusher has been installed at Antioch, Ill.

Junction City Sand Co., Junction City, Ga., plans to install a 500-ft. cableway.

The Atlas Rock Co. of Oakdale, Calif., has begun operations in its new sand and gravel plant near Oakdale.

Houston, Texas, has adopted specifications for road gravel which say that not more than 35% shall pass through a ¼-in. screen and not less than 50% shall pass through a ½-in. screen.

The Thompson sand plant, located near Cowles, Neb., is making arrangements for a record breaker the coming year. A new boat is being built which will make two on the lake, making it possible to load 15 cars of sand a day.

Belmont Sand and Gravel Co., Grand Rapids, Mich., has re-elected as officers: President, Maurice Sluyter; vice-president, Dan W. Kimball; secretary, I. R. Blandford; treasurer, Henry Van Aalderen; director and counsel, Fred Raymond.

Alabama Concrete Products Co., of Selma, Ala., is making an investment of several thousand dollars in the establishment of a new gravel screening plant on a tract recently acquired by the company on the Alabama river, near Selma. Complete development of the property is planned.

The Gaiser Paving Co. has started a plant in Livermore, Calif., to handle gravel. Their biggest work will be furnishing material for the new roads which are to be laid in the district about Livermore. One contract just secured calls for an expenditure of $175,000 with a specified date of completion at six months.

Spring Brook Sand Co., 516 Spruce street, Scranton, Pa., has a building, bins, elevator, shaker screens, belt line conveyor, locomotive, and a mile of standard track ,and expects to increase its output in 1924 from 8 to 12 cars a day; it will probably put in some sort of concrete products plant. William A. Wilcox is president.

Quarries

Pacific Stone Co., of Everett, Wash., will build a $4000 factory building at 4257 Eighth avenue, N.W., Seattle, Wash.

Ione Quarries is the name of a new company which will work red and white sandstone quarries near Sacramento, Calif.

Harry Brown, New Glasgow, Nova Scotia, is interested in the formation of a company with a capital of $30,000 to erect a plant at New Glasgow for crushing limestone.

E. W. True, of Grass Valley, Calif., is considering location of a rock crushing plant near Sacramento, Calif., for the purpose of crushing colored rock to use in stucco work, and may also grind colored rock for paint manufacture.

Arkansas Beauxite Products Co., of which C. D. Hyten, 313 Donaghey building, Little Rock, Ark., is president, will erect a plant on the Rock Island railroad with a daily capacity of 50 tons of commercial alum. Company has leased large holdings of bauxite.

Work of reconstructing the limestone plant of A. C. Blower, destroyed some weeks ago by fire at Ocala, Fla., is now under way, according to information received from Mr. Blower. The fire loss was about $30,000, and the new plant will represent about the same investment.

Oakland Paving Co. now has some 200 employes in handling 1000 yd. of blue trap rock daily. Their big plant is almost in the center of Oakland, Calif., and has work ahead in keeping up to the growth of the city. Almost every operation of the big plant is mechanical. Steam cranes and crushers and steam shovels and cars.

Sonora Granite Co. has reorganized and is now the East Belt Granite Co. The new place of business is Sonora, Calif., the office having been moved from San Francisco. The directors are: J. L. Gibbs of Tuolumne; D. J. Jacobs, Sonora; John Sasek, Jamestown; D. E. Doke and H. M. Willard, Los Angeles. The quarry, five miles from Sonora, will be reopened at once and new machinery installed.

Joplin Crushed Flint Co., of Joplin, Mo., is about to establish a crushing plant about 18 miles southeast of Kansas City. The firm was recently awarded the contract to furnish the state some of the crushed rock to be used on Federal Aid road work. The tonnage was of unlimited amount. This firm is also operating a crusher at Webb City, Mo. J. R. Hammond is president, and W. W. Holmes, manager.

Cement

H. H. Bowe has bought the Brown Bros. cement plant near Ohio City, Ohio.

The Santa Cruz Portland Cement Co. (California) has purchased 60 acres of additional ground to be used as a rock quarry. The consideration was $25,000.

Sandusky Cement Co., Sandusky, Ohio, is planning the erection of additions to its plant at Bay Bridge and the installation of an additional grinding department.

Signal Mountain Portland Cement Co., James building, Chattanooga, Tenn., is considering plans for additional units at its mill at Signal Mountain, Tenn., to cost $400,000 with machinery.

Vulcanite Portland Cement Co., Philadelphia, Pa. Annual report for the year ended December 31, 1923, has just been issued showing current assets of $853,401 against current liabilities of $225,195.

The plant of the Olympic Portland Cement Co. of Bellingham, Wash., began operating February 14, giving employment to 100 men at the factory and 50 men at the Balfour quarries. The plant was recently closed for repairs. The factory's daily capacity is 2000 bbl. The company reports the market outlook for cement to be very good.

Pacific Portland Cement Co. is taking bids for the concrete work in connection with the construction of its new cement plant in Redwood City, Calif., which will cost approximately $1,000,000. W. C. Stevenson, Pacific building, is the engineer. The piling contract was awarded to Duncan-Harrelson Co. and is well under way.

Concrete Products

Cement Products Co., of Davenport, Iowa, will build a $20,000 addition to its plant.

Straub Fireproof Block Co., Inc., Forest Park, Ill., changed name to Illinois Cinder Block Co.

Snow Brothers, Kernersville, N. C., are planning the manufacture of concrete blocks at that point.

Northwest Davenport Block Co., 1225 Davie street, Davenport, Iowa, of which H. E. Meier is general manager, is about to construct a $25,000 concrete block factory.

Concrete Products Co. of Seattle, Wash., is building a new plant in Seattle. The company has been established in the Northwest for approximately 15 years and operates factories at Everett, Wenatchee and Yakima. A. W. Swartz is principal owner and manager of the company.

Erection of a cement products plant at Avon Park, Fla., for the making of brick, cement tile, shingles and other concrete products, is announced by G. M. Wicker, representing the Keebler Cement Products Co. of Knoxville. According to Mr. Wicker the plant is to be put in Avon Park within the next few weeks and will be large enough to take care of all local demands.

Edgerton concrete plant building of Wilson, N. C., will be resumed immediately. Sherwood Brockwell, chief of the bureau of fire inspection, gave his permission that the work could be resumed and specified under what conditions the building would be allowed to be erected. Work was stopped

when one of the walls fell and killed a man. The walls, it was discovered, were only 8 in. thick. Under the state fire laws they must be 13 in.

Concrete Products Association (Canada) has been formed with the following officers: President, J. A. Livingston, Granite Concrete Block Co., Toronto; first vice-president, W. H. Edwards, Ontario Concrete Products, Woodbridge; second vice-president, W. Theaker, Hamilton, Ont.; secretary, H. W. Thompson, Toronto; treasurer, C. L. Wallace, Ontario Concrete Products, Woodbridge, Ont.; directors—T. W. Bishop, Ridgeville Concrete Works, Ridgeville, Ont.; W. H. Kelk, Fairbank Block and Supply, Fairbank, Ont.; C. R. Christie, Christie Concrete Products, Lindsay, Ont.; F. J. Kinsinger, Cast Stone Block and Machine Co., Ltd., Windsor, Ont., and Wm. Adamson, Excelsior Concrete Products, Ltd., Barrie, Ont. The aim of the new association is to facilitate the acquirement and interchange of practical knowledge among its members, create a recognized standard in the manufactured article and promote the use of concrete products in the building, particularly that of concrete blocks. The association intends to protect and further the growth of the industry by seeing that in every municipality standards are set for cement block manufacturers which will be recognized by the authorities and that no buildings be erected with blocks that do not come up to the test.

Gypsum

Fairmont Wall Plaster Co. of Fairmont, W. Va., has begun the erection of a two-story and basement office building on 10th street, to cost $10,000 and be of cinder block construction.

American Gypsum Co. of Port Clinton, Ohio, has elected the following officers: J. H. McCrady, Pittsburgh, president; F. J. Griswold, Port Clinton, vice-president; J. B. Davis, Cleveland, secretary and treasurer. Other directors elected are Edward McCrady, Braddock, Pa.; Harry Beens, Braddock; P. K. Tadsen, Port Clinton. The reports of the last year show a good business and plans have already been completed for the erection of a large building for the manufacture of building blocks and wall board. The capacity of the new plant will be double that of the old one.

Trade Literature

Louisville Drying Machinery Co. of Louisville, Ky., issues a handsome catalog describing the rotary steam tube, indirect hot air, direct heat and other dryers made by this company.

Cover of the new Louisville Cement Co.'s circular

Louisville Cement Co., Speed building, Louisville, Ky., has issued a circular describing "Speed" lime, a chemically hydrated lime of this company's manufacture. The cover of this circular is illustrated herewith.

Slag

Maple Hill Slate Co., Allentown, Pa., has been organized by Benjamin F. Hofelich, William J. Harding and William Faulk and plan to mine and finish slate products. Some machinery will be required later.

The Standard Slag Co., Steubenville, Ohio, contemplates the erection of a new plant in the vicinity of McMechen, W. Va., for the manufacture of cement products, estimated to cost $50,000 with equipment.

The Buffalo Slag Co., Ellicott Square, Buffalo, has acquired property near DuBois, Pa., for the erection of a new plant for the production of crushed and screened blast furnace slag. A power house is planned. It is proposed to commence work early in April.

Trade Notes

Raymond Bros. Impact Pulverizer Co., of Chicago, announces the removal of its Eastern office to 43 Broad street, New York.

Low Freezing Dynamite Proves Successful

TESTS were recently conducted at Hibbing and Virginia in northern Minnesota which prove that ordinary straight 40% dynamite now being made by the du Pont company on a low freezing formula was practically unaffected at a temperature of 35 deg. below zero. A continuous series of tests which had been made during the comparatively mild winter weather at those points when the temperature was at zero or a few degrees below, proved that the low freezing dynamite would detonate without difficulty. In the test made at 35 deg. below zero, it was shown that one cartridge would detonate another at 1 ft.

The development of this low freezing dynamite is considered to be the greatest advance made in the explosives field since the invention of dynamite by Nobel. It makes possible the use of dynamite in road building and all kinds of open construction work under any temperature encountered in the United States. The development of the low freezing dynamite was not accomplished over night, but has been gradual work.

Arthur La Motte, manager of the technical section of the du Pont company, recently reviewed the efforts made to develop dynamite which would withstand low temperatures. "About 1908 the du Pont company made some low freezing gelatin dynamite which withstood temperatures down to zero on a contracting job in the Berkshire hills," he said. "The contractors on that job found that the explosive had the remarkable property of retaining the summer strength without being thawed and they continued their work uninterrupted by any temperature encountered. This low freezing gelatin was continually improved until last year when a method was found for handling the low freezing nitro-glycerin which enabled it to be used in nearly all du Pont explosives, the improvements resulting in their successfully withstanding temperatures as low as 35 deg. below zero. Of scientific interest it might be stated that the inoculation of this dynamite at 15 deg. below zero with a crystal of frozen nitro-glycerin made on the old formula resulted in no freezing of the modern dynamite."

Kansas Farmers Want More Gravel Roads

THE farmers of this county are taking more interest in gravel roads since the test of gravel on several rural highways has proven a success. Petition forms have been taken out by farmers residing west of town on what is known as the State street road, asking gravel on this road for a distance of four miles, immediately west of Salina.

It was stated that the interest in this hard road assures the county commissioners that the petitions will be returned all signed up at the regular meeting of the board in November. Pieces of the State street road have been given a test with gravel. The road was flooded last spring and for several weeks after the overflow much of the road was impassable. The parts treated to gravel were exceptionally good after the flood, and none of the gravel was washed away.—*Topeka, Kans., Capital.*

Waste Limestone

DATA obtained during recent trips to lime plants in Pennsylvania, Ohio, and Maine by Dr. Oliver Bowles, mineral technologist, Department of the Interior, attached to the New Brunswick, N. J., experiment station of the Bureau of Mines, are being compiled in preparation of a report on the best means of producing lime from small stone. The importance of this work is indicated by a letter recently received at this station from a lime producer who stated that at one of his plants there is an annual accumulation of 300,000 tons of small stone which cannot be utilized for lime burning under present conditions of operation.

Government Studies Silica

IN the course of the investigation of technical problems pertaining to silica, being conducted by the Department of the Interior, through the Bureau of Mines, a number of silica preparation and sand mining and preparation plants in New Jersey have been visited. A study was made of methods employed in the calcining, grinding and pulverizing of flint, quartz and silica sand; mining, handling, blending and loading of molding sand; mining, washing and special cleaning of glass sand; and washing, screening and handling of sand-blast and filter sand. The Bureau of Mines has received valuable data from producers of various silica products. Study has been given to the needs of consumers using sand-blast sand, chemical and metallurgical quartz, filter sand and glass sand.

Huntington Called Lime City

Indiana Town in Which Lime Burning Has Been an Important Industry for Almost a Century and Still Going Strong

HUNTINGTON has won for itself the title of "The Lime City," and it has full claim to such designation. Huntington should be justly proud of the sobriquet, and in reciprocation lives up to each and every attribute of the title.

The geological formation of Huntington county's land reveals the reason for this significant description, with its wide and deep strata of limestone situated very near the subsoil. The strata of rock formation has made itself felt not only in the industrial life but in the community life as well. The water supply of Huntington and Huntington county contains a great amount of lime and lime compounds.

Began About 1842

Insofar as Huntington has received the crown as "The Lime City" it is only proper that the Lime Cityites should be recognizant of the history whereby the city has laid claim to this honor, and continues to hold it in the face of all kinds of opposition.

The first knowledge of application of Huntington's lime strata to the industrial field was in 1842 or 1844, the exact date of which is not known. Michael Householder opened the first kiln, a small structure on the site formerly occupied by Hawley Bros., east of Huntington. With his miniature kiln he burned a small quantity of lime for local consumption. As far as is known this was the first attempt to burn lime in Huntington county. He sold his kiln to John Lewis and Thomas Dillon in 1847.

Two or three years later a quarry was opened west of town near the old canal, and stone was quarried and shipped to Fort Wayne, where it was burned for lime. In 1858, Henry Drover opened a quarry and kiln on his farm. This was later purchased by James Fulton.

Lime Shipped by Canal

What is virtually conceded to be the beginning of the first real lime industry in Huntington, which later grew to proportions which enveloped the entire United States, came after Fulton purchased the land. With the quarry and kiln he bought from Drover he combined a quarry which he opened on land purchased from a man by the name of Thompson east of Huntington. He opened his quarry and in 1860 he built two kilns on the land and shipped lime down the canal to various points. This was the nativity of the lime industry in this county.

During the year of 1874, Prof. A. Cox of the State Department made a geological survey of the county. A report of Professor Cox indicated that there were in the county at that time one lime kiln, with an annual capacity of 617,000 bushels. Indicative of the quality of Huntington county lime, the Cox report avers as follows:

"This lime is held high in the estimation of all, and meets a ready market in not only Indiana, but in Ohio and Illinois as well."

It is more than probable that the optimistic tone of Professor Cox's statement on the local lime situation led to a widening of the field of the Huntington lime industry and aided in its blanketing the entire United States.

The Huntington White Lime Association was formed in December, 1870. Adam Beck was president, W. W. Hawley, vice-president and general agent. Within two years this company controlled 22 kilns and manufactured an output of 45 carloads a week. At this time there were outside interests, which controlled about a dozen kilns in addition. A statement of this company dated 1880 shows that there were 325,000 bushels of lime shipped from Huntington during that year.

Western Lime Co. Formed

The second Huntington company formed for the purpose of furthering the lime industry was incorporated in 1898. This company was the Western Lime Co. Peter Martin was selected as president, treasurer and general manager. A. L. Beck was vice-president, and W. W. Hawley, secretary. These three men with Jacob Martin, Michael Baltes, D. M. Hawley, Adam Beck, Enos Taylor, H. M. Purviance and C. E. Hawley formed the board of directors. With the formation of this company the leading figures in the Huntington lime industry were joined together and the many companies consolidated into one. The result of this consolidation was that the manner of lime production and distribution was perfected and improved.

In 1906 the Ohio and Western Lime Co. succeeded the Western Lime Co. This company operated five plants in Ohio, one in Bedford, Ind., and one in Huntington. This company in addition to shipping lime to every part of the United States also shipped about 10,000 carloads of stone to all parts of the country annually. The officers of this company were as follows: Peter Martin of this city continued in the capacity of president, treasurer and general manager; George D. Copeland of Marion, Ohio, was vice-president, and F. S. Whitcomb of Cleveland, Ohio, was secretary.—*Huntington, Ind., Press.*

Dolomite for Refractories

RESEARCH work on the utilization of dolomite in refractories is being continued by the Department of the Interior at the Ceramic Experiment Station of the Bureau of Mines, Columbus, Ohio. The main problem being studied is to combine the lime in the dolomite so that it will be non-slaking and at the same time hold up the refractories, thereby rendering available abundant deposits of dolomite for extensive use as a basic refractory. Work previously done by the Bureau of Mines on different fluxes for rendering dolomite refractories non-slaking indicated that by careful selection and preparation refractory bricks could be made, one of the best fluxes tried being alumina-iron flux. More recent work done by the bureau consisted of slaking time tests on varying proportions of dolomite mixed with an aluminua-iron flux. The proportion of flux to dolomite was varied between 5 and 20 per cent. The refractory properties as well as the slaking tendency of these mixes was studied. After the best proportion of flux to ground rock was determined, bricks were made by the soft mud and dry press processes, using both organic and inorganic binders. Then methods of firing to produce sound bricks were studied. As a result, a composition has been found which, when compounded with the proper binder and burned after a given procedure, produces a strong, non-slaking brick of high refractoriness. The bricks are satisfactory in every respect, except that uniform shrinkage has not been completely attained. During the coming year bricks will be produced and tried out in the industry.

New Gypsum Plaster Mill in Nevada to Supply North Pacific Coast

THE Pacific Portland Cement Co. is making rapid progress in the construction of a large mill near Gerlach on the Western Pacific railway north of Reno for the manufacture of plaster and other products from a huge deposit of gypsum. The mill is seven miles from Gerlach, Nev., and an equal distance from the mine. An aerial bucket tramway which is almost completed connects the mine and mill and a spur track extends five miles from the Western Pacific to the mill. The gypsum deposit is of high grade and is said to be practically inexhaustible. The entire plant when completed will represent an investment of well over $1,000,000. The product is used extensively in building houses of a type that first gained favor in southern California. The Gerlach mill will supply the market for the north Pacific coast. The gypsum deposit owned by this company at Mound House, a few miles east of Carson City, is approaching exhaustion and the mill there in time will be dismantled.—*Eureka, Nev., Sentinel.*

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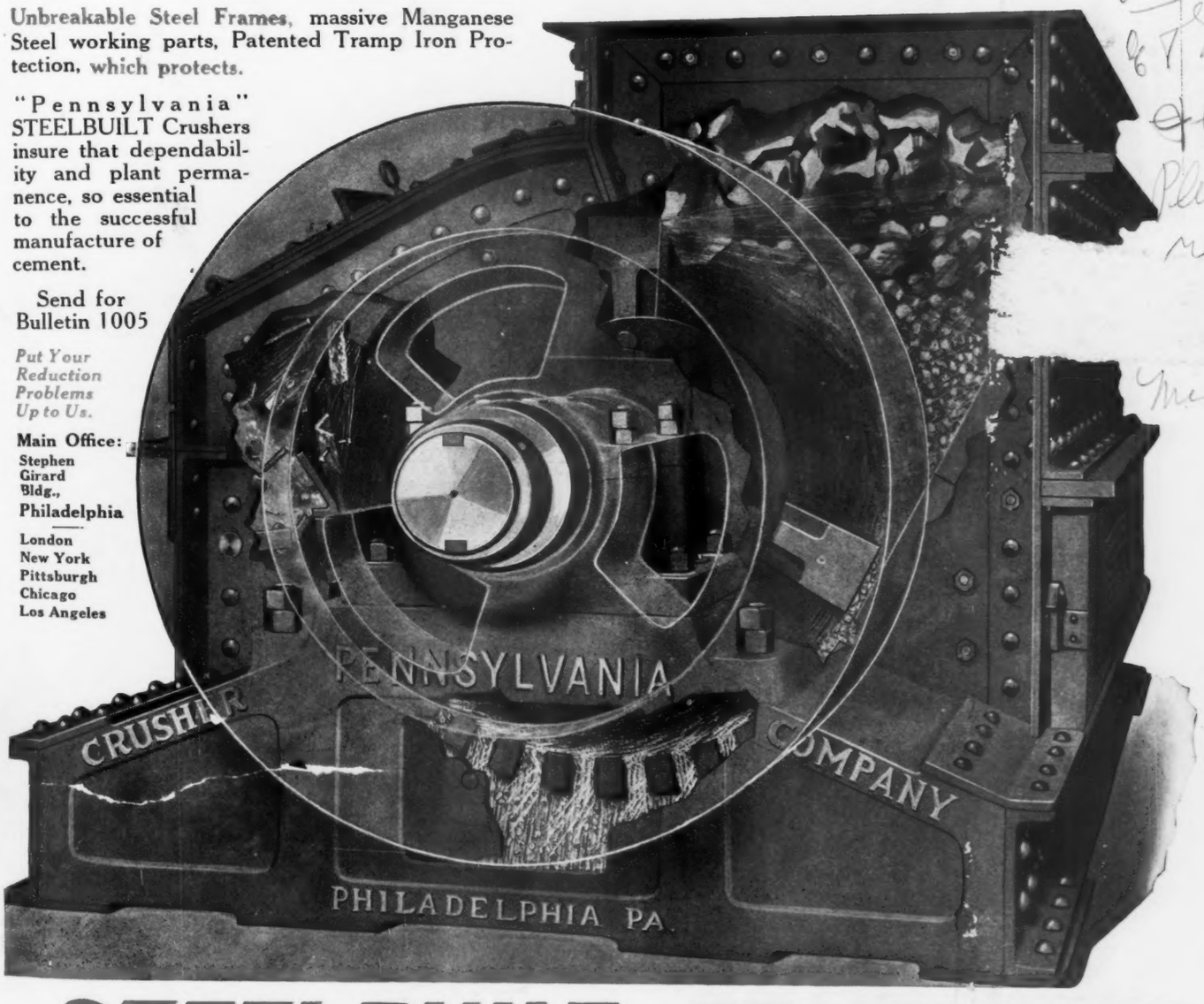

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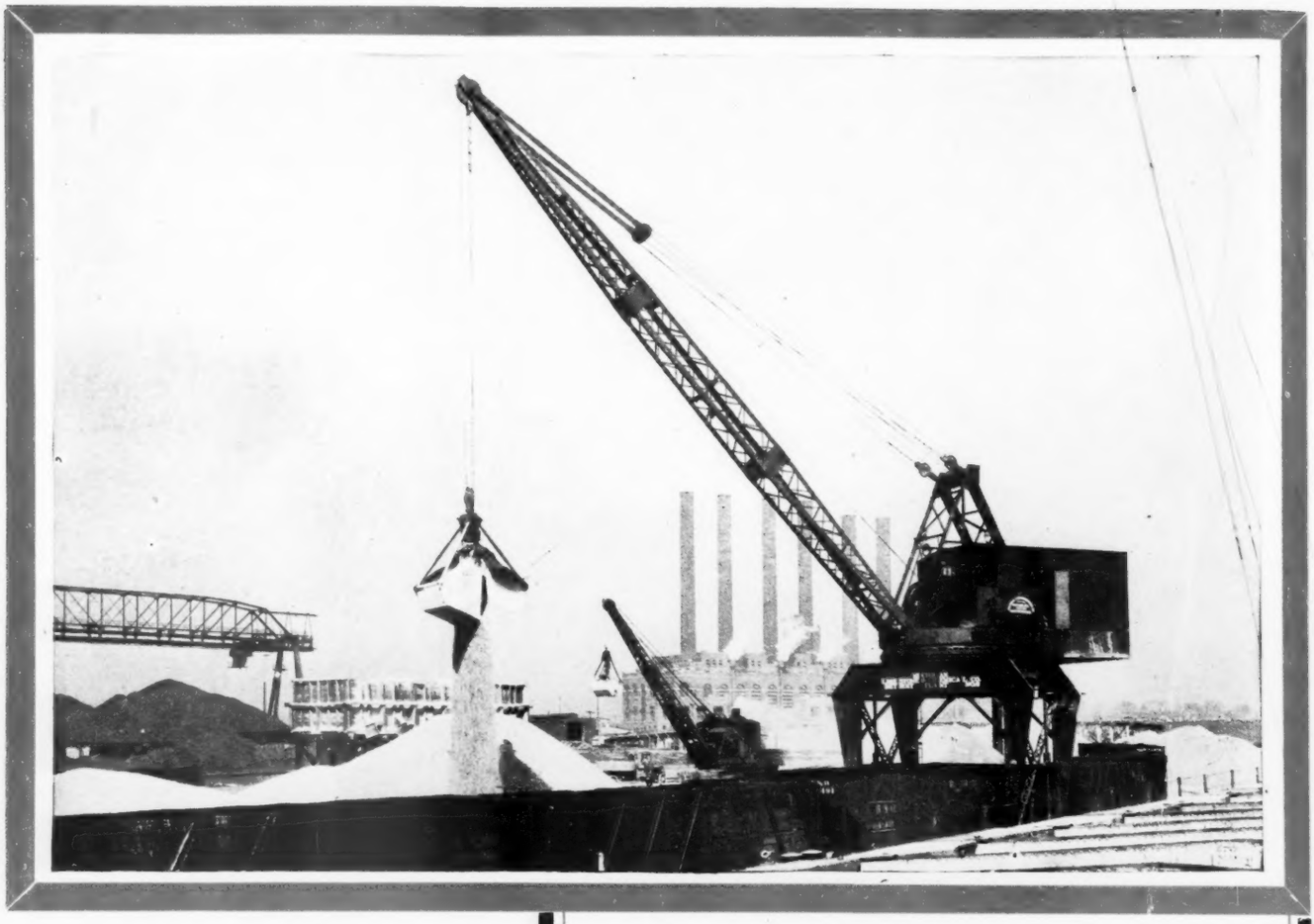

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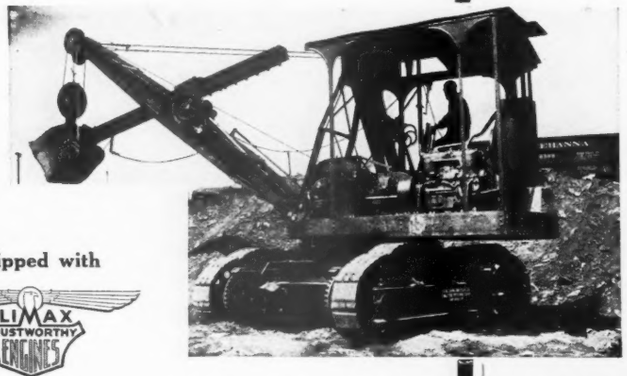

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